	Order	Title and content	Additional Info	Specification number	SMSC/ FBV/ Literacy/ Numeracy	Allenyes Skills for Life
Introduction to chemistry	1	Atoms	**Define** atom. **Draw** a model of an atom inc subatomic particles. **State** the mass and charge of subatomic particles	KS3 NC	Using postive and negative numbers. Use imagination and creativity in learning	Numeracy
	2	Atoms, elements and compounds	**Define** atom, element, mixture and compound. **Identify** atoms, elements, compound and mixtures from examples	KS3 NC	Using tier 3 vocabulary correctly	Literacy
	3	Basic word equations	**Identify** reactant and products from a word equation. **Name** simple componds containing two or 3 elements inc sulfates, carbonates and nitrates. **Explain** the use of the endings -ide and -ate in the name of compounds	KS3 NC	Understanding how sciencitifc names are constructed	Literacy
	4	Acids and alkalis	**Define** acids as being 'below a pH of 7'. **Define** alkalis as being 'a pH above 7'. **Label** the pH scale with strong acid, weak acid, strong alkali, weak alkali and neutral. **Identify** using the pH scale if unknown chemicals are acids or alkalis	KS3 NC	Using tier 3 vocabulary correctly. Using a number line to identify pH	Numeracy
	5	Neutralsiation and pH scale	**Define** neutralisation as 'an acid reacting with an alkali to make a neutral solution with the pH of 7'. **Recall** the general equation for neautralisation Acid + alkali --> salt + water. **Identify** the salt produced	KS3 NC	Using tier 3 vocabulary correctly.	Literacy
	6	Salts (word equations only)	**Write** word equations for metal carbonates and metals reacting with acids	KS3 NC	Understanding how sciencitifc names are constructed	Literacy
	7	PEER STAR - word equations	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet	KS3 NC		Independance
	8	Metal + non metal oxides (acidity)	**Describe** the properties of metal and non metal oxides inc acidity and solubility. **Name** different types of oxides. **Identify** whether unknown chemicals are metal or non metal oxides	KS3 NC	Using a number line to identify pH of unknown oxides	Numeracy
	9	Revision - optional				
	10	Test - Teacher STAR				
	11	Test feedback				
The Earth	12	Earth's structure /composition	**Describe** the structure of the earth as a sphere containing layers. **Describe** the compostion of the earth as the crust, core and mantle. **Label** a diagram of the Earths layers inc crust, mantle and outer and inner core. **Define** the core as the centre of the earth made of nickel and iron. **Define** the crust as a thin rocky layer on the outside of the earth. **Describe** the mantle as a layer of hot rock which has the properties of a solid but can flow very slowly	KS3 NC	Respect and tollerance of others beliefs: flat earthers. Using tier 3 vocabulary correctly	Literacy
	13	Igneous, sedimentary and metamorphic rock	Describe the formation of igneous rock as molten rock that has cooled and solidified. Explain why some igneous rock has large crystals(cooled slowly) and some has small crystals (cooled quickly). Describe igneous rock as randomly arranged interlocking crystals. Describe the formation of sedimentary rock as transport → deposition → sedimentation → compaction → cementation. Define sediment as 'small fragments of rock and soil that form layers'. Describe sedimentary rock as rounded grains in layers. Define metamorphic rock as igneous or sedimentary rocks changed by heat or pressure. Identify types of rock from images/ samples. Describe metamorphic rock as thin twisted layers with small crystals	KS3 NC	Using tier 3 vocabulary correctly	Literacy
	14	Peer Star - Earths strucutre and rocks	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet	KS3 NC		
	15	Weathering and errosion	Describe weathering as The breaking down of rocks in situ by physical (weather) biological (plants and animals) and chemical processes (acid rain). Describe erosion as the wearing away of pieces of rock, soil or other solid materials. Define the rock cycle as All the processes that are involved in creating, changing and destroying rocks. Describe the stages of the rock cycle including: weathering, transportation, sedimentation, compaction, cementation, uplift, heating and pressure	KS3 NC	Using tier 3 vocabulary correctly	Literacy

	16	Scientific literacy	Students to use the reading for learning stategy to help with comprehension of scientific literature	KS3 NC	Reading comprehension. How Science is portrayed in the media	
	17	Revision - optional				
	18	Test - Teacher STAR				
	19	Test feedback				
Atomic structure	20	Atoms elements and compounds and writing word equations	Atoms of each element are represented by a chemical symbol, eg O represents an atom of oxygen. An atom is the smallest part of an element that can exist. There are about 100 elements. Elements are found in the periodic table. Compounds are formed from elements by chemical reactions. Chemical reactions invole the formation of one or more new stubstances often with a detectable energy change. Compounds contain two or more elements chemically combined in fixed proportions. Compounds can be represented by formulae using the symbols of the atoms from which they formed. Compounds can only be separated into elements by chemical reactions	KS3 NC 5.1.1.1	Using tier 3 vocabulary correctly	Literacy
	21	Composites, polymers and ceramics (intro KS3)	Define polymer as 'lots of small molecules joined together to make long molecules'. Describe the properties of polymers as chemically unreactive, solids at room temperature, often plastic – they can be moulded into shape, electrical insulators, strong and hard-wearing. Define ceramics as' solids made by baking a starting material in a very hot oven or kiln' State two examples of ceramics (bricks and pottery). Describe the properties of ceramics as brittle, hard under compression and strong Define composite materials as 'materials which are made from two or more different types of material'. Explain materials for a composite material are chosen because they have different properties that combine to make a more useful material	KS3 NC	Correct use of tier 3 vocabulary . Social: Use of polymers and composites in society	Literacy
	22	Crystalisation and filtration	**Define** mixture as two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged. Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions and no new substances are made. **Describe, explain** and **give examples of** crystalisation and filtration	KS3 NC 5.1.1.2	Social: Use of filtration in society	Problem solving
	23	Distillation	**Describe, explain and give examples of** distillation	KS3 NC 5.1.1.2	Social: Use of distilation in society	Problem solving
	24	Chromatography	**Describe, explain and give examples of** Chromatography	KS3 NC 5.1.1.2	Social: Use of chromatography in society	Problem solving

	25	Atoms and their history	**State** Atoms are very small (radius of 0.1 nm). The radius of a nucleus 1/10 000 of that of the atom. Almost all of the mass of an atom is in the nucleus. Atoms have no overall charge. **Draw** a labelled nuclear model of the atom. **Describe** the development of the atomic model (atoms were thought to be tiny spheres that could not be divided, the discovery of the electron led to the plum pudding model of the atom. The plum pudding model suggested that the atom is a ball of positive charge with negative electrons embedded in it. The results from the alpha particle scattering experiment led to the conclusion that the mass of an atom was concentrated at the centre (nucleus) and that the nucleus was charged. This nuclear model replaced the plum pudding model. Niels Bohr adapted the nuclear model by suggesting that electrons orbit the nucleus at specific distances. The theoretical calculations of Bohr agreed with experimental observations. Later experiments led to the idea that the positive charge of any nucleus could be subdivided into a whole number of smaller particles, each particle having the same amount of positive charge. The name proton was given to these particles. The experimental work of James Chadwick provided the evidence to show the existence of neutrons within the nucleus. This was about 20 years after the nucleus became an accepted scientific idea). Describe why the new evidence from the scattering experiment led to a change in the atomic model. Describe the difference between the plum pudding model of the atom and the nuclear model of the atom.	KS3 NC 5.1.1.1, 5.1.1.3, 5.1.1.5	Using timelines. Cultrual: understanding an appriciating personal influences	Creativity
	26	Peer STAR - history of an atom	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet			
	27	Calculating subatomic particles	The number of protons in an atom of an element is its atomic number. All atoms of a particular element have the same number of protons. Atoms of different elements have different numbers of protons. The sum of the protons and neutrons in an atom is its mass number. **Calculate** the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number	5.1.1.4	Addition and subtraction	Numeracy
	28	Relative atomic mass / isotopes	Atoms of the same element can have different numbers of neutrons; these atoms are called isotopes of that element. The relative atomic mass of an element is an average value that takes account of the abundance of the isotopes of the element. **Calculate** the relative atomic mass of an element given the percentage abundance of its isotopes	5.1.1.6	Addition, subtraction, multiplication and division	Numeracy
	29	Electronic structure	The electrons in an atom occupy the lowest available energy levels (innermost available shells). There are two electrons in the lowest energy level, eight in the second energy level and one in the third energy level. **Draw and write** the electronic structure of the first 20 elements	5.1.1.7	Addition and subtraction	Problem solving
	30	Revision - optional				
	31	Test - Teacher STAR				
	32	Test feedback				
Periodic table	33	The periodic table	The elements in the periodic table are arranged in order of atomic (proton) number and so that elements with similar properties are in columns, known as groups. The table is called a periodic table because similar properties occur at regular intervals. Elements in the same group in the periodic table have the same number of electrons in their outer shell (outer electrons) and this gives them similar chemical properties. **Explain** how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number	KS3 NC 5.1.2.1	Using tier 3 vocabulary correctly	Literacy

	34	The development of the periodic table	**Describe** the steps in the development of the periodic table. Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their atomic weights. The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed. Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights. Elements with properties predicted by Mendeleev were discovered and filled the gaps. Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct	KS3 NC 5.1.2.2	Spiritual: Experiencing awe and wonder Cultural: understanding and appriciating personal influences	Problem solving
	35	Metals and non metals	Elements that react to form positive ions are metals and negative ions are non metals. Majority of elements are metals. Position of metals (bottom left) and non metals (top right) on the periodic table. **Explain** the differences between metals and non-metals on the basis of their characteristic physical and chemical properties. **Explain** how the atomic structure of metals and non-metals relates to their position in the periodic table. **Explain** how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number.	KS3 NC 5.1.2.3	Identifying patterns in data	Numeracy
	36	Group 1	The elements in Group 1 of the periodic table are known as the alkali metals and have characteristic properties because of the single electron in their outer shell. **Describe** the reactions of the first three alkali metals with oxygen, chlorine and water. **Explain** why the reactivity increases going down the group. **Explain** how properties depend on the outer shell of electrons of the atoms. **Predict** properties from given trends down the group.	KS3 NC 5.1.2.5	Identifying patterns in data	Numeracy
	37	Group 7	The elements in Group 7 of the periodic table are known as the halogens and have similar reactions because they all have seven electrons in their outer shell. The halogens are non-metals and consist of molecules made of pairs of atoms.In Group 7, the further down the group an element is the higher its relative molecular mass, melting point and boiling point. **Predict** properties from given trends down the group.	KS3 NC 5.1.2.6	Identifying patterns in data	Numeracy
	38	Group 7 reactivity	In Group 7, the reactivity of the elements decreases going down the group. **Describe** the nature of the compounds formed when chlorine, bromine and iodine react with metals and non-metals A more reactive halogen can displace a less reactive halogen from an aqueous solution of its salt. **Explain** how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms	KS3 NC 5.1.2.6	Use of tier 3 vocabulary correctly	Literacy
	39	Peer STAR - group 1 vs group 7	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet			
	40	Group 0	Group 0 is called the noble gases. They are unreactive and do not easily form molecules because their atoms have stable arrangements of electrons. The noble gases have eight electrons in their outer shell, except for helium, which has only two electrons. The boiling points of the noble gases increase with increasing relative atomic mass (going down the group). **Explain** how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms. **Predict** properties from given trends down the group	KS3 NC 5.1.2.4	Identifying patterns in data	Numeracy
	41	Scientific literacy	Students to use the reading for learning stategy to help with comprehension of scientific literature		Reading comprehension. How Science is portrayed in the media	
	43	Revision - optional				
	44	Test - Teacher STAR				
	45	Test feedback				

Chemistry of the atmosphere	46	The earths early and current atmosphere	Describe the current compostion of the atmosphere (80% nitrogen, 20% oxygen and small proportions of carbon dioxide, water vapour and noble gases). Discuss theories about what was in the Earth's early atmosphere and how the atmosphere was formed have changed and developed over time (Volcanoes (released water, carbon dioxide and nitrogen), earth cooling and water condensing into oceans, carbon dioxide dissiolved in the oceans, carbonates precipitated into sediments reducing carbon dioxide. Oxygen increased and carbon dioxide decreased by plants and alge photosynthesising. Carbon dioxide was also trapped in rocks and fossils. State evidence for the early atmosphere is limited because of the time scale of 4.6 billion years. Interpret evidence and evaluate different theories about the Earth's early atmosphere. Describe the main changes in the atmosphere over time and some of the likely causes of these changes.	KS3 NC 5.9.1.1, 5.9.1.2, 5.9.1.3, 5.9.1.4	Mutual respect and tollerance for others beliefs	Communication
	47	Formation of Earths resources	Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.	5.9.1.4	Use of tier 3 vocabulary correctly	Literacy
	47	Greenhouse gases	Greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life. Water vapour, carbon dioxide and methane are greenhouse gases. Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter	KS3 NC 5.9.2.1, 5.9.2.3	Moral values: human impact on our planet and enviroment	
	48	Peer STAR - greenhouse effect	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet			
	49	Human activities and climate change	Some human activities increase the amounts of greenhouse gases in the atmosphere. These include:carbon dioxide and methane. Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane. Many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change, however, it is difficult to model such complex systems as global climate change. This leads to simplified models, speculation and opinions presented in the media that may be based on only parts of the evidence and which may be biased. Evaluate the quality of evidence in a report about global climate change given appropriate information. Describe uncertainties in the evidence base and recognise the importance of peer review of results and of communicating results to a wide range of audiences.	KS3 NC 5.9.2.2	Moral values: human impact on our planet and enviroment. Interpreting data	Numeracy
	50	Carbon footprint	The carbon footprint is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event. The carbon footprint can be reduced by reducing emissions of carbon dioxide and methane. Describe actions to reduce emissions of carbon dioxide and methane and Give reasons why actions may be limited.	KS3 NC 5.9.2.4	Moral values: human impact on our planet and enviroment	Empathy
	51	Atmospheric pollutants and properties	The combustion of fuels is a major source of atmospheric pollutants. Most fuels, including coal, contain carbon and/or hydrogen and may also contain some sulfur. The gases released into the atmosphere when a fuel is burned may include carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and oxides of nitrogen. Solid particles and unburned hydrocarbons may also be released that form particulates in the atmosphere. Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels. Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used.Carbon monoxide is a toxic gas. It is colourless and odourless and so is not easily detected. Sulfur dioxide and oxides of nitrogen cause respiratory problems in humans and cause acid rain. Particulates cause global dimming and health problems for humans. Describe and explain the problems caused by increased amounts of these pollutants in the air.	5.9.3.1, 5.9.3.2	Moral values: human impact on our planet and enviroment	Empathy
	52	Scientific literacy	Students to use the reading for learning stategy to help with comprehension of scientific literature		Reading comprehension. How Science is portrayed in the media	

	53	Revision - optional				
	54	Test - Teacher STAR				
	55	Test feedback				
			Optional extra topic			
	A	Ionic bonding	When a metal atom reacts with a non-metal atom electrons in the outer shell of the metal atom are transferred. Metal atoms lose electrons to become positively charged ions. Non-metal atoms gain electrons to become negatively charged ions. The ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 have the electronic structure of a noble gas (Group 0). **Draw** dot and cross diagrams for ionic compounds formed by Groups 1 and 2 with Groups 6 and 7. **Work out** the charge on the ions of metals and non-metals from the group number of the element, limited to Groups 1 and 2, 6 and 7. **Deduce** that a compound is ionic from a diagram of its structure in one of the specified forms. **Describe** the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure. **Work out** the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure	5.2.1.2	Positive and negative numbers	Numeracy
	B	Covalent bonding	When atoms share pairs of electrons, they form strong covalent bonds. Covalently bonded substances may consist of small molecules. **Recognise** common substances that consist of small molecules from their chemical formula. Some covalently bonded substances have very large molecules, such as polymers. Some covalently bonded substances have giant covalent structures, such as diamond and silicon dioxide. **Draw** dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane. **Represent** the covalent bonds in small molecules, in the repeating units of polymers and in part of giant covalent structures, using a line to represent a single bond. **Describe** the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent molecules or giant structures. **Deduce** the molecular formula of a substance from a given model or diagram in these	5.2.1.4	Counting	Numeracy
	C	Metallic bonding and properties of metals	**Describe and draw** metallic strcutures (giant structures of atoms arranged in a regular pattern). The electrons in the outer shell of metal atoms are delocalised and so are free to move through the whole structure. The sharing of delocalised electrons gives rise to strong metallic bonds. Metals have giant structures of atoms with strong metallic bonding. This means that most metals have high melting and boiling points. In pure metals, atoms are arranged in layers, which allows metals to be bent and shaped. Pure metals are too soft for many uses and so are mixed with other metals to make alloys which are harder. **Explain** why alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal. Metals are good conductors of electricity because the delocalised electrons in the metal carry electrical charge through the metal. Metals are good conductors of thermal energy because energy is transferred by the delocalised electrons.	5.2.1.5, 5.2.2.7, 5.2.2.8	Correct use of tier 3 vocabulary	Literacy
	D	Peer STAR drawing bonds	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet			

	E	States of matter inc state symbols	The three states of matter are solid, liquid and gas. Particle theory can help to explain melting, boiling, freezing and condensing.The amount of energy needed to change state from solid to liquid and from liquid to gas depends on the strength of the forces between the particles of the substance. The nature of the particles involved depends on the type of bonding and the structure of the substance. The stronger the forces between the particles the higher the melting point and boiling point of the substance. (HT only) **Explain** the Limitations of the simple model above include: there are no forces, that all particles are represented as spheres and that the spheres are solid. **Predict** the states of substances at different temperatures given appropriate data. **Explain** the different temperatures at which changes of state occur in terms of energy transfers and types of bonding. **Recognise** that atoms themselves do not have the bulk properties of materials. **Use** appropriate state symbols	KS3 NC 5.2.2.1, 5.2.2.2	Positive and negative numbers, using number lines	Literacy
	65	Revision - optional					
	66	Mock - Teacher STAR					
	67	Test feedback					