Order		Title and content	Additional Info	Specification number	SMSC/ FBV/ Literacy/ Numeracy	Allenyes Sills for life
Rates of reaction	1	Calcuating rates of reaction	The rate of a chemical reaction can be found by measuring the quantity of a reactant used or the quantity of product formed over time: mean rate of reaction = quantity of reactant or product used/ time taken. The quantity of reactant or product can be measured by the mass in grams or by a volume in cm3 . The units of rate of reaction may be given as g/s or cm3 /s. **Calculate** the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed and the time taken. **Draw, and interpret,** graphs showing the quantity of product formed or quantity of reactant used up against time. **Draw** tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction. Higher only: **Use** quantity of reactants in terms of moles and units for rate of reaction in mol/s and **Calculate** the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time.	5.6.1.1	Using graphs, using equations, multiplicatin, division	Numeracy
	2	Collision theory and activation energy	Collision theory explains how various factors affect rates of reactions. According to this theory, chemical reactions can occur only when reacting particles collide with each other and with sufficient energy. The minimum amount of energy that particles must have to react is called the activation energy.	5.6.1.3	Correct use of tier 3 vocabulary	Literacy
	3	Factors which affect rates of reaction	Increasing the concentration of reactants in solution, the pressure of reacting gases, and the surface area of solid reactants increases the frequency of collisions and so increases the rate of reaction. Increasing the temperature increases the frequency of collisions and makes the collisions more energetic, and so increases the rate of reaction. **Predict and explain** using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction. **Recall** how changing these factors affects the rate of chemical reaction. **Predict and explain** the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio. **Use** simple ideas about proportionality when using collision theory to explain the effect of a factor on the rate of a reaction.	5.6.1.2	Correct use of tier 3 vocabulary	Literacy
	4	Peer STAR - graphs (higher = tangents)	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet		Interpreting graphs, H - tangents	Numeracy
	5	Catalysts	Catalysts change the rate of chemical reactions but are not used up during the reaction. Different reactions need different catalysts. Enzymes act as catalysts in biological systems. Catalysts increase the rate of reaction by providing a different pathway for the reaction that has a lower activation energy. A reaction profile for a catalysed reaction can be drawn **Identify** catalysts in reactions from their effect on the rate of reaction and because they are not included in the chemical equation for the reaction. **Explain** catalytic action in terms of activation energy.	5.6.1.4	Correct use of tier 3 vocabulary	Literacy
	6	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	Communication

	7	Reversible reactions and equilibrium	In some chemical reactions, the products of the reaction can react to produce the original reactants. Such reactions are called reversible reactions and are represented: A + B C + D The direction of reversible reactions can be changed by changing the conditions. When a reversible reaction occurs in apparatus which prevents the escape of reactants and products, equilibrium is reached when the forward and reverse reactions occur at exactly the same rate.	5.6.2.1, 5.6.2.3	Correct use of tier 3 vocabulary	Literacy
	8	Exo and endothermic reactions	If a reversible reaction is exothermic in one direction, it is endothermic in the opposite direction. The same amount of energy is transferred in each case.	5.6.2.2	Correct use of tier 3 vocabulary	Literacy
	9	H- the effect of changing conditions on equilibrium	The relative amounts of all the reactants and products at equilibrium depend on the conditions of the reaction. If a system is at equilibrium and a change is made to any of the conditions, then the system responds to counteract the change. The effects of changing conditions on a system at equilibrium can be predicted using Le Chatelier's Principle. **Predict**, qualitively the effect of changes on systems at equilibrium when given appropriate information for pressure, temperature and concentration.	5.6.2.4, 5.6.2.5, 5.6.2.6, 5.6.2.7	Correct use of tier 3 vocabulary	Literacy
	70	T- harber process	The Haber process is used to manufacture ammonia, which can be used to produce nitrogen-based fertilisers. The raw materials for the Haber process are nitrogen and hydrogen. **Recall** a source for the nitrogen and a source for the hydrogen used in the Haber process. The purified gases are passed over a catalyst of iron at a high temperature (about 450°C) and a high pressure (about 200 atmospheres). Some of the hydrogen and nitrogen reacts to form ammonia. The reaction is reversible so some of the ammonia produced breaks down into nitrogen and hydrogen: nitrogen + hydrogen ammonia On cooling, the ammonia liquefies and is removed. The remaining hydrogen and nitrogen are recycled. **Interpret** graphs of reaction conditions versus rate. **Apply** the principles of dynamic equilibrium in Reversible reactions and dynamic equilibrium to the Haber process. **Explain** the trade-off between rate of production and position of equilibrium. **Explain** how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.	T4.10.4.1	Interpeting data to draw a conclusion	Numeracy
	71	T- fertilisers	Compounds of nitrogen, phosphorus and potassium are used as fertilisers to improve agricultural productivity. NPK fertilisers contain compounds of all three elements. Industrial production of NPK fertilisers can be achieved using a variety of raw materials in several integrated processes. NPK fertilisers are formulations of various salts containing appropriate percentages of the elements. Ammonia can be used to manufacture ammonium salts and nitric acid. Potassium chloride, potassium sulfate and phosphate rock are obtained by mining, but phosphate rock cannot be used directly as a fertiliser. Phosphate rock is treated with nitric acid or sulfuric acid to produce soluble salts that can be used as fertilisers. **Recall** the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid. **Compare** the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.	T4.10.4.2	Interpeting data to draw a conclusion	Numeracy
	10	Required practical	Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity.	Required practical 5	Taking measurements, Mutural resepect and tollerance	Teamwork
	11	Revision - optional				

	12	Test - Teacher STAR				
	13	Test feedback				
	14	Pure substances and Formulations	In chemistry, a pure substance is a single element or compound, not mixed with any other substance. Pure elements and compounds melt and boil at specific temperatures. Melting point and boiling point data can be used to distinguish pure substances from mixtures. In everyday language, a pure substance can mean a substance that has had nothing added to it, so it is unadulterated and in its natural state, eg pure milk. **Use** melting point and boiling point data to distinguish pure from impure substances. A formulation is a mixture that has been designed as a useful product. Many products are complex mixtures in which each chemical has a particular purpose. Formulations are made by mixing the components in carefully measured quantities to ensure that the product has the required properties. Formulations include fuels, cleaning agents, paints, medicines, alloys, fertilisers and foods. **Identify** formulations given appropriate information. Students do not need to know the names of components in proprietary products.	5.8.1.1 and 5.8.1.2	Interpeting data to draw a conclusion	Numeracy
	15	Chromatography	Chromatography can be used to separate mixtures and can give information to help identify substances. Chromatography involves a stationary phase and a mobile phase. Separation depends on the distribution of substances between the phases. The ratio of the distance moved by a compound (centre of spot from origin) to the distance moved by the solvent can be expressed as its Rf value: Rf = distance moved by substance distance moved by solvent Different compounds have different Rf values in different solvents, which can be used to help identify the compounds. The compounds in a mixture may separate into different spots depending on the solvent but a pure compound will produce a single spot in all solvents. **Explain** how paper chromatography separates mixtures. **Suggest** how chromatographic methods can be used for distinguishing pure substances from impure substances. **Interpret** chromatograms and determine Rf values from chromatograms. **Provide** answers to the appropriate number of Significant figues	5.8.1.3	Using equations. Social: uses of chomatography	Numeracy
	16	Required practical	Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Calculate Rf values.	Required practical 6	Using equations	Teamwork
	17	Peer STAR Rf values	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet		Using equations	Numeracy
	18	Tests for gases	The test for oxygen (glowing splint relights) , hydrogen (lit splint, squeaky pop) , carbon dioxide (bubble through limewater, cloudy) and chlorine (Damp litmus paper, bleaches white).	5.8.2	Interpeting data to draw a conclusion	Numeracy
Chemical analysis	19	T - Flame tests and flame emmision spec	Flame tests can be used to identify some metal ions (cations). Lithium, sodium, potassium, calcium and copper compounds produce distinctive colours in flame tests: • lithium compounds result in a crimson flame • sodium compounds result in a yellow flame • potassium compounds result in a lilac flame • calcium compounds result in an orange-red flame • copper compounds result in a green flame. If a sample containing a mixture of ions is used some flame colours can be masked. Identify species from the results of the tests in 4.8.3.1 to 4.8.3.5	T 4.8.3.1	Interpeting data to draw a conclusion	Numeracy

	20	T- tests for metal hydroxides	Sodium hydroxide solution can be used to identify some metal ions (cations). Solutions of aluminium, calcium and magnesium ions form white precipitates when sodium hydroxide solution is added but only the aluminium hydroxide precipitate dissolves in excess sodium hydroxide solution. Solutions of copper(II), iron(II) and iron(III) ions form coloured precipitates when sodium hydroxide solution is added. Copper(II) forms a blue precipitate, iron(II) a green precipitate and iron(III) a brown precipitate. **Write** balanced equations for the reactions to produce the insoluble hydroxides. Students are not expected to write equations for the production of sodium aluminate.	T 4.8.3.2	Interpeting data to draw a conclusion	Numeracy
	21	T - tests for carbonates, halides, sulfates	Carbonates react with dilute acids to form carbon dioxide gas. Carbon dioxide can be identified with limewater. Halide ions in solution produce precipitates with silver nitrate solution in the presence of dilute nitric acid. Silver chloride is white, silver bromide is cream and silver iodide is yellow. Sulfate ions in solution produce a white precipitate with barium chloride solution in the presence of dilute hydrochloric acid.	T.4.8.3.3 ,T.4.8.3.4, T.4.8.3.5	Interpeting data to draw a conclusion	Numeracy
	22	T- instrumental methods	Elements and compounds can be detected and identified using instrumental methods. Instrumental methods are accurate, sensitive and rapid. Students should be able to state advantages of instrumental methods compared with the chemical tests in this specification. Flame emission spectroscopy is an example of an instrumental method used to analyse metal ions in solutions. The sample is put into a flame and the light given out is passed through a spectroscope. The output is a line spectrum that can be analysed to identify the metal ions in the solution and measure their concentrations. Interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set in the same form, limited to flame emission spectroscopy.	T 4.8.3.6 T4.8.3.7	Interpeting data to draw a conclusion	Numeracy
		Required practical	Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections Flame tests (page 73) to Sulfates (page 74).	Required practical 7	Social: developing social skills via practical work Mutual respect and tollerance	Teamwork
	23	Revision - optional				
	24	Test - Teacher STAR				
	25	Test feedback				
Organic chemistry	26	Crude oil, hydrocarbons an alkenes	Crude oil is a finite resource found in rocks. Crude oil is the remains of an ancient biomass consisting mainly of plankton that was buried in mud. Crude oil is a mixture of a very large number of compounds. Most of the compounds in crude oil are hydrocarbons, which are molecules made up of hydrogen and carbon atoms only. Most of the hydrocarbons in crude oil are hydrocarbons called alkanes. The general formula for the homologous series of alkanes is CnH2n+2 The first four members of the alkanes are methane, ethane, propane and butane. **Recognise** substances as alkanes given their formulae or strucutral formula.	5.7.1.1	Correct use of tier 3 vocabulary	Literacy

	27	Fractional distillation and petrochemicals	The many hydrocarbons in crude oil may be separated into fractions, each of which contains molecules with a similar number of carbon atoms, by fractional distillation. The fractions can be processed to produce fuels and feedstock for the petrochemical industry. Many of the fuels on which we depend for our modern lifestyle, such as petrol, diesel oil, kerosene, heavy fuel oil and liquefied petroleum gases, are produced from crude oil. Many useful materials on which modern life depends are produced by the petrochemical industry, such as solvents, lubricants, polymers, detergents. The vast array of natural and synthetic carbon compounds occur due to the ability of carbon atoms to form families of similar compounds. **Explain** how fractional distillation works in terms of evaporation and condensation.	5.7.1.2	Correct use of tier 3 vocabulary	Literacy
	28	Properties of hydrocarbons	Some properties of hydrocarbons depend on the size of their molecules, including boiling point, viscosity and flammability. These properties influence how hydrocarbons are used as fuels. **Recall** how boiling point, viscosity and flammability change with increasing molecular size. The combustion of hydrocarbon fuels releases energy. During combustion, the carbon and hydrogen in the fuels are oxidised. The complete combustion of a hydrocarbon produces carbon dioxide and water. **Write** balanced equations for the complete combustion of hydrocarbons with a given formula. Knowledge of trends in properties of hydrocarbons is limited to: • boiling points • viscosity • flammability.	5.7.1.3	Identifying trends in data	Numeracy
	29	Cracking and alkenes	Hydrocarbons can be broken down (cracked) to produce smaller, more useful molecules. Cracking can be done by various methods including catalytic cracking and steam cracking. **Describe** the conditions used for catalytic cracking and steam cracking. The products of cracking include alkanes and another type of hydrocarbon called alkenes. Alkenes are more reactive than alkanes and react with bromine water, which is used as a test for alkenes. **Recall** the colour change when bromine water reacts with an alkene. There is a high demand for fuels with small molecules and so some of the products of cracking are useful as fuels. Alkenes are used to produce polymers and as starting materials for the production of many other chemicals. **Balance** chemical equations as examples of cracking given the formulae of the reactants and products. **Give** examples to illustrate the usefulness of cracking. **Explain** how modern life depends on the uses of hydrocarbons.	5.7.1.4	Social: understanding the need for cracking in the community, balancing equations	Numeracy
	30	Scientific literacy	Students to use the reading for learning stategy to help with comprehension of scientific literature		Reading comprehension. Social: How Science is portrayed in the media	Communication
	31	Peer STAR - cracking equations	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet		Balancing equations	
	32	T- Structure and formulae of alkenes	Alkenes are hydrocarbons with a double carbon-carbon bond. The general formula for the homologous series of alkenes is CnH2n Alkene molecules are unsaturated because they contain two fewer hydrogen atoms than the alkane with the same number of carbon atoms. The first four members of the homologous series of alkenes are ethene, propene, butene and pentene. Recognise the names of these alkenes from their formula or structural formula	T4.7.2.1	Correct use of tier 3 vocabulary	Literacy

	33	T- Reactions of alkenes	Alkenes are hydrocarbons with the functional group C=C. It is the generality of reactions of functional groups that determine the reactions of organic compounds. Alkenes react with oxygen in combustion reactions in the same way as other hydrocarbons, but they tend to burn in air with smoky flames because of incomplete combustion. Alkenes react with hydrogen, water and the halogens, by the addition of atoms across the carbon-carbon double bond so that the double bond becomes a single carbon-carbon bond. **Describe** the reactions and conditions for the addition of hydrogen, water and halogens to alkenes. **Draw** fully displayed structural formulae of the first four members of the alkenes and the products of their addition reactions with hydrogen, water, chlorine, bromine and iodine.	T4.7.2.2	Correct use of tier 3 vocabulary	Literacy
	34	T- Alcohols	Alcohols contain the functional group –OH. Methanol, ethanol, propanol and butanol are the first four members of a homologous series of alcohols. **Describe** what happens when any of the first four alcohols react with sodium, burn in air, are added to water, react with an oxidising agent. **Recall** the main uses of these alcohols. Aqueous solutions of ethanol are produced when sugar solutions are fermented using yeast. **Recall** the conditions used for fermentation of sugar using yeast. **Recognise** alcohols from their names or from given formulae for methanol, ethanol, propanol and butanol. **Write** balanced chemical equations for the combustion of alcohols only	T4.7.2.3	Correct use of tier 3 vocabulary	Literacy
	35	T- Carboxylic acids	Carboxylic acids have the functional group –COOH. The first four members of a homologous series of carboxylic acids are methanoic acid, ethanoic acid, propanoic acid and butanoic acid. **Describe** what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols. **Explain** why carboxylic acids are weak acids in terms of ionisation and pH. **Recognise** carboxylic acids from their names or from given formulae for methanoic acid, ethanoic acid, propanoic acid and butanoic acid only.	T4.7.2.4	Correct use of tier 3 vocabulary	Literacy
	36	T- Addition polymerisations	Alkenes can be used to make polymers such as poly(ethene) and poly(propene) by addition polymerisation. In addition polymerisation reactions, many small molecules (monomers) join together to form very large molecules (polymers). For example: In addition polymers the repeating unit has the same atoms as the monomer because no other molecule is formed in the reaction. **Recognise** addition polymers and monomers from diagrams in the forms shown and from the presence of the functional group C=C in the monomers. **Draw** diagrams to represent the formation of a polymer from a given alkene monomer. **Relate** the repeating unit to the monomer.	T4.7.3.1	Correct use of tier 3 vocabulary	Literacy
	37	T/H - Condensation polymerisation	Condensation polymerisation involves monomers with two functional groups. When these types of monomers react they join together, usually losing small molecules such as water, and so the reactions are called condensation reactions. The simplest polymers are produced from two different monomers with two of the same functional groups on each monomer. **Explain** the basic principles of condensation polymerisation by reference to the functional groups in the monomers and the repeating units in the polymers.	T4.7.3.2	Correct use of tier 3 vocabulary	Literacy
	38	T/H - Amino acids	Amino acids have two different functional groups in a molecule. Amino acids react by condensation polymerisation to produce polypeptides. For example: glycine is H2NCH2COOH and polymerises to produce the polypeptide Different amino acids can be combined in the same chain to produce proteins.	T4.7.3.3	Correct use of tier 3 vocabulary	Literacy

	39	T- DNA	DNA (deoxyribonucleic acid) is a large molecule essential for life. DNA encodes genetic instructions for the development and functioning of living organisms and viruses. Most DNA molecules are two polymer chains, made from four different monomers called nucleotides, in the form of a double helix. Other naturally occurring polymers important for life include proteins, starch and cellulose. **Name** the types of monomers from which these naturally occurring polymers are made.	T4.7.3.4	Correct use of tier 3 vocabulary	Literacy
	40	Revision - optional				
	41	Test - Teacher STAR				
	42	Test feedback				
Using resources	43	Using Earths resources	Humans use the Earth's resources to provide warmth, shelter, food and transport. Natural resources, supplemented by agriculture, provide food, timber, clothing and fuels. Finite resources from the Earth, oceans and atmosphere are processed to provide energy and materials. Chemistry plays an important role in improving agricultural and industrial processes to provide new products and in sustainable development, which is development that meets the needs of current generations without compromising the ability of future generations to meet their own needs. **State** examples of natural products that are supplemented or replaced by agricultural and synthetic products. **Distinguish** between finite and renewable resources given appropriate information. **Extract and interpret** information about resources from charts, graphs and tables. **Use** orders of magnitude to evaluate the significance of data.	5.10.1.1	Moral: Effect of using resources on the Earth, Interpeting graphs and other forms of data	Numeracy
	44	Potable water	Water of appropriate quality is essential for life. For humans, drinking water should have sufficiently low levels of dissolved salts and microbes. Water that is safe to drink is called potable water. Potable water is not pure water because it contains dissolved substances. The methods used to produce potable water depend on available supplies of water and local conditions. In the UK, rain provides water with low levels of dissolved substances (fresh water) that collects in the ground and in lakes and rivers, and most potable water is produced by: • choosing an appropriate source of fresh water • passing the water through filter beds • sterilising. Sterilising agents used for potable water include chlorine, ozone or ultraviolet light. If supplies of fresh water are limited, desalination of salty water or sea water may be required. Desalination can be done by distillation or by processes that use membranes such as reverse osmosis. These processes require large amounts of energy. **Distinguish** between potable water and pure water. **Describe** the differences in treatment of ground water and salty water. **Give** reasons for the steps used to produce potable water	5.10.1.2	Correct use of tier 3 vocabulary	Literacy
	45	Peer STAR - steps to potable water	Half an hour to complete the independent practise (closed book exercise). Half an hour to mark and complete STAR feedback sheet			
	46	Waste water	Urban lifestyles and industrial processes produce large amounts of waste water that require treatment before being released into the environment. Sewage and agricultural waste water require removal of organic matter and harmful microbes. Industrial waste water may require removal of organic matter and harmful chemicals. Sewage treatment includes: • screening and grit removal • sedimentation to produce sewage sludge and effluent • anaerobic digestion of sewage sludge • aerobic biological treatment of effluent. **Comment on** the relative ease of obtaining potable water from waste, ground and salt water.	5.10.1.3	Correct use of tier 3 vocabulary	Literacy

	47	Required practical	Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	Required practical 8	Social: developing social skills via practical work Mutual respect and tollerance	Teamwork
	48	H- Alternative methods of extracting metals	The Earth's resources of metal ores are limited. Copper ores are becoming scarce and new ways of extracting copper from low-grade ores include phytomining, and bioleaching. These methods avoid traditional mining methods of digging, moving and disposing of large amounts of rock. Phytomining uses plants to absorb metal compounds. The plants are harvested and then burned to produce ash that contains metal compounds. Bioleaching uses bacteria to produce leachate solutions that contain metal compounds. The metal compounds can be processed to obtain the metal. For example, copper can be obtained from solutions of copper compounds by displacement using scrap iron or by electrolysis. **Evaluate** alternative biological methods of metal extraction, given appropriate information.	5.10.1.4	Interpeting data to draw a conclusion	Numeracy
	49	Life cycle assessment	Life cycle assessments (LCAs) are carried out to assess the environmental impact of products in each of these stages: • extracting and processing raw materials • manufacturing and packaging • use and operation during its lifetime • disposal at the end of its useful life, including transport and distribution at each stage. Use of water, resources, energy sources and production of some wastes can be fairly easily quantified. Allocating numerical values to pollutant effects is less straightforward and requires value judgements, so LCA is not a purely objective process. Selective or abbreviated LCAs can be devised to evaluate a product but these can be misused to reach pre-determined conclusions, eg in support of claims for advertising purposes. **Carry out** simple comparative LCAs for shopping bags made from plastic and paper.	5.10.2.1	Interpeting data to draw a conclusion	Numeracy
	50	Ways of reducing the use of resources	The reduction in use, reuse and recycling of materials by end users reduces the use of limited resources, use of energy sources, waste and environmental impacts. Metals, glass, building materials, clay ceramics and most plastics are produced from limited raw materials. Much of the energy for the processes comes from limited resources. Obtaining raw materials from the Earth by quarrying and mining causes environmental impacts. Some products, such as glass bottles, can be reused. Glass bottles can be crushed and melted to make different glass products. Other products cannot be reused and so are recycled for a different use. Metals can be recycled by melting and recasting or reforming into different products. The amount of separation required for recycling depends on the material and the properties required of the final product. For example, some scrap steel can be added to iron from a blast furnace to reduce the amount of iron that needs to be extracted from iron ore. **Evaluate** ways of reducing the use of limited resources, given appropriate information.	5.10.2.2	Moral: Effect of using resources on the Earth, Interpeting graphs and other forms of data	Numeracy
	51	T- corrosion and prevention	Corrosion is the destruction of materials by chemical reactions with substances in the environment. Rusting is an example of corrosion. Both air and water are necessary for iron to rust. Corrosion can be prevented by applying a coating that acts as a barrier, such as greasing, painting or electroplating. Aluminium has an oxide coating that protects the metal from further corrosion. Some coatings are reactive and contain a more reactive metal to provide sacrificial protection, eg zinc is used to galvanise iron. **Describe** experiments and **interpret** results to show that both air and water are necessary for rusting. **Explain** sacrificial protection in terms of relative reactivity.	T4.10.3.1	Interpeting data to draw a conclusion	Numeracy

	52	T- alloys and useful materials	Most metals in everyday use are alloys. Bronze is an alloy of copper and tin. Brass is an alloy of copper and zinc. Gold used as jewellery is usually an alloy with silver, copper and zinc. The proportion of gold in the alloy is measured in carats. 24 carat being 100% (pure gold), and 18 carat being 75% gold. Steels are alloys of iron that contain specific amounts of carbon and other metals. High carbon steel is strong but brittle. Low carbon steel is softer and more easily shaped. Steels containing chromium and nickel (stainless steels) are hard and resistant to corrosion. Aluminium alloys are low density. **Recall** a use of each of the alloys specified. **Interpret and evaluate** the composition and uses of alloys other than those specified given appropriate information.	T4.10.3.2	Interpeting data to draw a conclusion	Numeracy
	53	T- ceramics, composites and polymers	Most of the glass we use is soda-lime glass, made by heating a mixture of sand, sodium carbonate and limestone. Borosilicate glass, made from sand and boron trioxide, melts at higher temperatures than soda-lime glass. Clay ceramics, including pottery and bricks, are made by shaping wet clay and then heating in a furnace. The properties of polymers depend on what monomers they are made from and the conditions under which they are made. For example, low density (LD) and high density (HD) poly(ethene) are produced from ethene. Thermosoftening polymers melt when they are heated. Thermosetting polymers do not melt when they are heated. **Explain** how low density and high density poly(ethene) are both produced from ethene. **Explain** the difference between thermosoftening and thermosetting polymers in terms of their structures. Most composites are made of two materials, a matrix or binder surrounding and binding together fibres or fragments of the other material, which is called the reinforcement. **Recall** some examples of composites. **Compare** quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals. **Explain** how the properties of materials are related to their uses and select appropriate materials.	T4.10.3.3	Interpeting data to draw a conclusion	Numeracy
	54	Revision - optional				
	55	Test - Teacher STAR				
	56	Test feedback				
	57	Revision for GCSE - focus decided upon by class teacher based on mocks				
	58	Exam				