

GCSE Chemistry Sequence of Learning (SoL)

C1 Atomic structure				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Atoms	- Describe the basic structure of an atom. - Explain the difference between a pure element and a compound. - Name and give the chemical symbol of the first 20 elements in the Periodic Table.	Atom, Element	KS3 Educake Retrieval Homework
2	Lesson 2 – Chemical equations	- Describe familiar chemical reactions with balanced symbol equations, including state symbols. - Balance straightforward equations given symbol equations. - Explain why mass is conserved in a chemical reaction.	Balanced symbol equation, Word equation	
3	Lesson 3 – Separating mixtures	- Explain how the chemical properties of a mixture relate to the chemicals it is made from. - Explain the difference between a compound and a mixture. - Describe different separation techniques.	Mixture, Compound, Filtration, Solution	
4	Lesson 4 – Fractional distillation and paper chromatography	- Describe the process of fractional distillation. - Explain the main processes occurring in paper chromatography.	Fractional distillation, Chromatography, Rf (retention factor)	
5	Lesson 5 – History of the atom	- Explain how evidence from scattering experiments changed the model of the atom. - Describe the plum-pudding model of the atom.		Educake Retrieval Homework
6	Lesson 6 – Structure of the atom	- Describe atoms using the atomic model. - Use the atomic number and mass number of familiar atoms to determine the number of each sub-atomic particle. - Explain why atoms have no overall charge.	Atomic number, Mass number, Neutron, Proton, Electron	
7	Lesson 7 – Ions, atoms, and isotopes	- Explain why ions have a charge. - Describe isotopes using the atomic model. - Convert a very small size given in metres to nanometres. - Use atomic number and mass numbers of familiar ions to determine the number of each sub-atomic particle.	Ion, Isotope, Nanoscience, Nanoparticles	
8	Lesson 8 – Electronic structures	- Write the standard electronic configuration notation from a diagram for the first 20 elements. - Explain why elements in the same group react in a similar way.	Electronic structure, Shell, Group	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C2 The Periodic Table				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Development of the Periodic Table	- Describe what Mendeleev had to change in his pattern of atomic masses to create his Periodic Table. - Explain why the Periodic Table was a breakthrough in how to order elements.	Mendeleev, Atomic Mass, Periodicity, Predicted Elements, Isotopes	Educake Retrieval Homework
2	Lesson 2 – Electronic structures and the Periodic Table	- Describe how the electronic structure of metals and non-metals are different. - Explain in terms of electronic structure how the elements are arranged in the Periodic Table. - Explain why the Noble Gases are unreactive and the trend in their boiling points.	Noble Gases, Valence Electrons, Shells, Inert, Boiling Point Trend	

3	Lesson 3 – Group 1 – the Alkali Metals	- Recognise trends in supplied data. - Explain why the elements in Group 1 react similarly and why the first three elements float on water. - Illustrate the reactions of Group 1 metals with balanced symbol equations.	Alkali Metals, Density, Reactivity, Hydroxide, Effervescence	
4	Lesson 4 – Group 7 – the Halogens	- Recognise trends in supplied data. - Explain why the elements in Group 7 react similarly. - Explain how to complete a Halogen displacement reaction and explain what happens in the reaction.	Halogens, Diatomic, Displacement, Reactivity Trend, Halide	Educake Retrieval Homework
5	Lesson 5 – Explaining trends	- Explain how electronic structure affects the trend in reactivity of Group 1 elements. - Explain how electronic structure affects the trend in reactivity of Group 7 elements.	Atomic Radius, Shielding, Nuclear Attraction, Electrostatic, Ionisation	
6	Lesson 6 – The transition elements (Chemistry only)	- Explain the use of a transition metal in terms of its physical properties. - Describe how the properties of Group 1 metals compare with transition metals.	Transition Element, Catalyst, Thermal Conductivity, Ductility, Malleability	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C3 Structure and bonding				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – States of matter	- Use data to determine the state of a substance at a given temperature. - Explain, in terms of particles, the energy and temperature of a substance when it is at the melting point or boiling point. - Use the particle model to explain why substances have different melting and boiling points from each other.	Atmosphere, Viscosity	Educake Retrieval Homework
2	Lesson 2 – Atoms into ions	- Draw dot and cross diagrams of compounds formed between Group 1 and Group 7 elements in ionic bonding. - Describe, with an example, how a Group 1 metal atom becomes a positive ion, and a Group 7 non-metal atom forms a negative ion.	Dot and cross diagram, Ion	
3	Lesson 3 – Ionic bonding	- Explain that opposite charges attract and that is how the ions in an ionic compound are held together. - Explain, in terms of position in the Periodic Table and electronic structure, how unfamiliar elements become ions. - Draw a dot and cross diagram of an ionic compound that involves more than two ions in its formula.	Ionic bond	
4	Lesson 4 – Giant ionic structures	- Explain why ionic compounds have a high melting point and can conduct electricity. - Explain the movement of ions in solution or when molten.	Giant lattice, Electrolyte	Educake Retrieval Homework
5	Lesson 5 – Covalent bonding	- Explain how a covalent bond forms in terms of electronic structure. - Draw dot and cross diagrams and ball and stick diagrams for H₂, Cl₂, O₂, N₂, HCl, H₂O, NH₃, and CH₄. - Describe a double bond in a diatomic molecule in terms of the electrons involved.	Covalent bond, Covalent bonding, Double bond	
6	Lesson 6 – Structures of simple molecules	- Explain how the size of molecules affects melting and boiling points. - Explain why small molecules and polymers do not conduct electricity. - Identify substances that would have weak intermolecular forces.	Intermolecular forces, Polymer	
7	Lesson 7 – Giant covalent structures	- Recognise the structure of diamond and graphite from information provided in written or diagrammatic form. - Explain the properties of diamond in terms of its bonding. - Explain the properties of graphite in terms of its bonding.	Giant covalent structure	

8	Lesson 8 – Fullerenes and graphene	- Recognise the structure of a fullerene or nanotube in diagrams and prose. - Explain the structure of fullerenes. - List the properties and consequent uses of fullerenes and carbon nanotubes.	Fullerene	
9	Lesson 9 – Bonding in metals	- Describe metallic bonding. - Recognise and represent metallic bonding diagrammatically.	Delocalised electron	Educake Retrieval Homework
10	Lesson 10 – Giant metallic structures	- Explain key physical properties of metals using the model of metallic bonding. - Describe why metals are alloyed.	Alloy, Giant metallic structure	
11	Lesson 11 – Nanoparticles (Chemistry only)	- Describe the size of nanoparticles. - Explain why surface area to volume ratio increases as particle size decreases. - Convert lengths into standard form.	Nanoscience, Nanoparticles, Standard form	
12	Lesson 12 – Applications of nanoparticles (Chemistry only)	- List the advantages and disadvantages of using nanoparticles. - Explain why nanoparticles can have new applications.		
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C4 Chemical calculations				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Relative masses and moles	- Explain why some elements have the same relative atomic mass as each other. - Calculate the relative formula mass for unfamiliar compounds when the formula is given. - State the units for the amount of substance.	Relative atomic mass A_r , Relative formula mass M_r , Mole, Molecular formula	Educake Retrieval Homework
2	Lesson 2 – Equations and calculations (HT only)	- Explain why chemical equations must be balanced, making reference to the conservation of mass. - Calculate the relative formula mass for one substance when the relative formula masses are given for all the other substances in a balanced symbol equation.	Balanced symbol equation, Law of the conservation of energy	
3	Lesson 3 – From masses to balanced equations (HT only)	- Balance an equation given the masses of reactants and products. - Identify the limiting reactant in a chemical reaction.	Limiting reactant	
4	Lesson 4 – The yield of a chemical reaction (Chemistry only)	Calculate percentage yield when the actual yield is given and the mass of the limiting reactant is given. List reasons why actual yield is often lower than theoretical yield.	Percentage yield	Educake Retrieval Homework
5	Lesson 5 – Atom economy (Chemistry only)	- Calculate the atom economy for a given simple chemical reaction. - Explain why using reactions with high atom economy is important.	Atom economy	
6	Lesson 6 – Expressing concentrations	- Explain the concentration of a solution in terms of particles. - Calculate the mass of solute (in g) in a solution when given the concentration in g/dm³ and volume in dm³ or cm³.	Concentration	
7	Lesson 7 – Titrations (Chemistry only)	- Describe how an indicator can be used to determine the end point. - Explain how accuracy can be improved in a titration.	Titration, End point, Burette, Pipette, Accurate, Precise	
8	Lesson 7 – Titrations (Chemistry only) Required practical	- Describe how an indicator can be used to determine the end point. - Explain how accuracy can be improved in a titration.	Titration, End point, Burette, Pipette, Accurate, Precise	Educake Retrieval Homework
9	Lesson 8 – Titration calculations (Chemistry only, HT only)	- Calculate the concentration of a solution in mol/dm³ when given the amount of solute in moles and volume of solution in dm³. - Calculate the amount of acid or alkali needed in a neutralisation reaction. - Calculate the mole and mass of solute (in g) in a solution when given the concentration in mol/dm³ and volume in dm³ or cm³.		
10	Lesson 9 – Volumes of gases (Chemistry only, HT only)	Calculate the amount in moles of gas in a given volume at room temperature and pressure. Calculate the volume of a gaseous substance involved in a chemical reaction.		
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due

	FEEDBACK LESSON			
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C5 Chemical changes				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – The reactivity series	- Write word equations for the metals listed in the reactivity series reacting with oxygen, water, and acid, and balance given symbol equations. - Predict observations for the metals listed in the reactivity series reacting with oxygen, water, and acid.	Reactivity series, Oxidation, Reduction	Educake Retrieval Homework
2	Lesson 2 – Displacement reactions	- Explain why a displacement reaction occurs. - Write word equations and straightforward balanced symbol equations for displacement reactions. - Predict observations for the metals listed in the reactivity series reacting with a different metal salt.	Displacement reaction	
3	Lesson 3 – Extracting metals	- Identify species that are being oxidised and reduced in a chemical reaction. - Explain why some metals are found uncombined in the Earth's crust.	Ore, Oxidised, Reduced	
4	Lesson 4 – Salts from metals	- Describe how to make a salt by reacting a metal with an acid. - Write a balanced symbol equation to describe a reaction between a metal and sulfuric acid or hydrochloric acid.	Salt	Educake Retrieval Homework
5	Lesson 5 – Salts from insoluble bases	- Describe a method to prepare a pure, dry sample of a soluble salt from an insoluble substance and a dilute acid. - Write a balanced symbol equation to describe a reaction between a metal hydroxide or oxide and sulfuric acid or hydrochloric acid. - Explain why the reaction between a base and a dilute acid is a neutralisation reaction.	Base, Neutralisation	
6	Lesson 5 – Salts from insoluble bases Required practical	- Describe a method to prepare a pure, dry sample of a soluble salt from an insoluble substance and a dilute acid. - Write a balanced symbol equation to describe a reaction between a metal hydroxide or oxide and sulfuric acid or hydrochloric acid. - Explain why the reaction between a base and a dilute acid is a neutralisation reaction.	Base, Neutralisation	
7	Lesson 6 – Making more salts	- Describe how to make a dry sample of a salt from reacting a metal carbonate or an alkali with a dilute acid. - Write balanced symbol equations for neutralisation reactions.	Alkali	Educake Retrieval Homework
8	Lesson 7 – Neutralisation and the pH scale	- Describe how universal indicator can be used to classify a chemical as acidic or alkaline. - Describe how solutions can be acidic or alkaline. - Explain how the pH of a solution changes as acid or alkali is added.	Neutralisation, pH, Universal indicator, Acid, Alkali, Neutral	
9	Lesson 8 – Strong and weak acids (HT only)	- Describe how an acid can be concentrated or dilute. - Describe how an acid can be weak or strong. - Calculate the pH of a solution given its concentration of hydrogen ions expressed in standard form.	Strong acids, Weak acids, Concentration	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C6 Electrolysis				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Introduction to electrolysis	- Describe electrolysis in terms of movement of ions. - Write a word equation to describe the electrolysis of a molten ionic compound. - Predict the products at each electrode for the electrolysis of a molten ionic compound.	Electrolysis, Electrolyte, Anode, Cathode	Educake Retrieval Homework
2	Lesson 2 – Changes at the electrodes	- Describe electrolysis of solutions in terms of movement of ions. - Write a balanced symbol equation including state symbols for the overall electrolysis of a solution.		

		Predict the products at each electrode for the electrolysis of a molten ionic compound or its solution.		
3	Lesson 2 – Changes at the electrodes Required practical	- Describe electrolysis of solutions in terms of movement of ions. - Write a balanced symbol equation including state symbols for the overall electrolysis of a solution. - Predict the products at each electrode for the electrolysis of a molten ionic compound or its solution.		
4	Lesson 3 – The extraction of aluminium	- Describe the electrolysis of aluminium oxide. - Explain why electrolysis is an expensive metal extraction method and illustrate this with the extraction of aluminium. - Write a balanced symbol equation for the electrolysis of aluminium oxide.		Educake Retrieval Homework
5	Lesson 4 – Electrolysis of aqueous solutions	- Describe how to electrolyse brine in terms of ions moving. - Predict the products of electrolysis from a range of aqueous solutions. - Plan and carry out an electrolysis investigation.	Aqueous solution	
	REVISION LESSON			
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	FEEDBACK LESSON			

C7 Energy changes				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Exothermic and endothermic reactions	- Explain, using observations from calorimetry, how to classify a reaction as exothermic or endothermic. Explain in detail how to carry out a calorimetry experiment. - Describe examples of exothermic and endothermic reactions.	Exothermic, Endothermic	Educake Retrieval Homework
2	Lesson 1 – Exothermic and endothermic reactions Required practical	- Explain, using observations from calorimetry, how to classify a reaction as exothermic or endothermic. Explain in detail how to carry out a calorimetry experiment. - Describe examples of exothermic and endothermic reactions.	Exothermic, Endothermic	
3	Lesson 2 – Using energy transfers from reactions	- Explain how an energy change from a chemical reaction can be used. - Suggest a chemical reaction for a specific purpose based on the energy change for the reaction.		
4	Lesson 3 – Reaction profiles	- Label activation energy on a reaction profile diagram. - Generate a specific reaction profile diagram for a given chemical reaction when its energy change is also supplied. - Identify bonds broken in reactants and new bonds made in products of a reaction.	Reaction profile, Activation energy	
5	Lesson 4 – Bond energy calculations (HT only)	- Explain why bond breaking is endothermic and bond making is exothermic. - Define bond energy and identify all the bonds that break and are made in a chemical reaction. - Calculate the energy change for a simple reaction, including the correct unit.	Bond energy	Educake Retrieval Homework
6	Lesson 5 – Chemical cells and batteries (chemistry only)	- Explain how potential difference can be changed in a cell. - Interpret data from an electrochemical cell to determine the reactivity of the metals involved. - Explain why non-rechargeable batteries stop working.	Fuel cells	
7	Lesson 6 – Fuel cells (Chemistry only)	- Explain how a hydrogen fuel cell produces electricity. - List the advantages and disadvantages of hydrogen fuel cells.	Electrical (chemical) cells	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C8 Rates and equilibrium				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Rate of reaction	- Describe how to calculate the mean rate of a reaction. - Sketch a graph to show the results of measuring the mass of product formed in a reaction over time.	Rate of reaction	Educake Retrieval Homework

2	Lesson 2 – Collision theory and surface area	- Describe how changing the surface area changes the rate of reaction. - Describe what the activation energy of a reaction is.	Collision theory, Activation energy	
3	Lesson 2 – Collision theory and surface area Required practical	- Describe how changing the surface area changes the rate of reaction. - Describe what the activation energy of a reaction is.	Collision theory, Activation energy	
4	Lesson 3 – The effect of temperature	- Use collision theory to explain how changing temperature alters the rate of reaction. - Calculate mean rates of reaction from experimental data.		
5	Lesson 4 – The effect of concentration and pressure	- Use collision theory to explain how changing concentration or pressure alters the rate of a reaction. - Explain how to change gas pressure. - Calculate mean rates of reaction.	Concentration, Pressure	
6	Lesson 4 – The effect of concentration and pressure Required practical	- Use collision theory to explain how changing concentration or pressure alters the rate of a reaction. - Explain how to change gas pressure. - Calculate mean rates of reaction.	Concentration, Pressure	Educake Retrieval Homework
7	Lesson 5 – The effect of catalysts	- Use collision theory to explain how adding a catalyst alters the rate of reaction. - Calculate the mean rate of a reaction. - Explain why catalysts stop working eventually.	Catalyst	
8	Lesson 6 – Reversible reactions	- Explain, using a familiar example, how a reaction can be reversible. - Describe a familiar reversible reaction using a balanced symbol equation. - Predict the observations of a familiar reversible reaction when the conditions are changed.	Reversible reaction	
9	Lesson 7 – Energy and reversible reactions	- Explain why the energy change in a reversible reaction is exothermic in one direction and endothermic in the reverse direction. - Generate balanced symbol equations for reversible reactions from information provided.		Educake Retrieval Homework
10	Lesson 8 – Dynamic equilibrium	- Describe how rate of the forward reaction compares to rate of the backward reaction in a dynamic equilibrium. - Describe Le Châtelier's Principle.	Equilibrium, Le Châtelier's Principle	
11	Lesson 9 – Altering conditions (HT only)	- Explain how changing conditions for a system at dynamic equilibrium affects the rate of the forward and reverse reactions. - Predict the effect on yield of changing temperature, concentration, or pressure in a given equilibrium system.	Yield	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C9 Crude oil and fuels				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Hydrocarbons	- Describe how to separate crude oil into fractions in a school laboratory. - Classify a hydrocarbon as an alkane. - State the names of the first four alkanes.	Hydrocarbon, Fraction, Alkane	Educake Retrieval Homework
2	Lesson 2 – Fractional distillation of oil	- Describe how the trend in viscosity, flammability, and boiling point changes as the length of the hydrocarbon chain changes. - Describe how the properties of a fraction of crude oil make it appropriate for its use. - Describe why we need to separate the fractions in crude oil.	Fractional distillation, Viscosity, Flammable, Boiling point	
3	Lesson 3 – Burning hydrocarbon fuels	- Describe how to test for the products of complete combustion of a hydrocarbon. - Write balanced symbol equations for the complete combustion of hydrocarbons.	Combustion	
4	Lesson 4 – Cracking hydrocarbons	- Describe the process of cracking, including conditions. - Create a balanced symbol equation to describe cracking. - Describe a chemical test to show an alkene is present. Describe the two ways used in an oil refinery to crack alkanes.		
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C10 Organic reaction				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Reactions of the alkenes	- Draw the displayed structural formulae for the first four alkenes. - Draw the displayed structural formulae for the products of the addition reactions between alkenes and hydrogen, water (steam), or a halogen. - Predict the word and balanced symbol equations for the complete combustion of an alkene when the number of carbon atoms is given.	Alkene	Educake Retrieval Homework
2	Lesson 2 – Structures of alcohols, carboxylic acids, and esters	- Classify an organic compound as an alcohol, a carboxylic acid, or an ester. - Draw the structural and displayed formulae for the first four primary alcohols and the first four carboxylic acids. - Draw the structural and displayed formulae for ethyl ethanoate.	Functional group, Homologous series	
3	Lesson 3 – Reactions and uses of alcohols	- Describe fermentation to make aqueous solutions of ethanol, including a word equation. - Describe the reactions of alcohols, including using word equations. - Give structural and displayed formulae of ethanol and explain why it is a biofuel.	Fermentation, Biofuel	
4	Lesson 4 – Carboxylic acids and esters	- Describe why carboxylic acids are acidic. - Use word equations to describe the reactions of carboxylic acids with metal carbonates and with alcohols. - Draw the displayed formula of ethyl ethanoate.		Educake Retrieval Homework
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C11 Polymers				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Addition polymerisation	- Describe how monomers become polymers. - Draw the monomer for an addition polymer when the structure of the polymer is given. Draw an addition polymer structure when the structure of the monomer is given.	Monomers, Polymer, Addition polymerisation	Educake Retrieval Homework
2	Lesson 2 – Condensation polymerisation (HT only)	- Describe the process of condensation polymerisation. - Draw a simplified structure of the monomers for a condensation polymer when the structure of the polymer is given. - Draw a simplified structure of a condensation polymer when the structures of the monomers are given.	Condensation polymerisation	
3	Lesson 3 – Natural polymers	- Identify the monomer from the structural formula of a natural polymer. - Describe the structure of an amino acid. - Describe the differences in the structures of the starch polymer and the cellulose polymer.		
4	Lesson 4 – DNA	- Describe the main structure of DNA. - Describe the importance of DNA for living systems. - Sketch the shape of a DNA strand.	DNA (deoxyribonucleic acid)	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C12 Chemical analysis				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Pure substances and mixtures	- Describe the difference between pure substances, impure substances, and formulations. - Explain how melting point and boiling point data can be used to determine the purity of a substance. - Calculate percentage composition of components in a range of formulations.	Pure substance, Mixture, Formulation	Educake Retrieval Homework

2	Lesson 2 – Analysing chromatograms	- Explain how chromatography separates solutes. - Calculate Rf values from given data. - Use a chromatogram to determine if a sample is pure or impure.	Chromatography, Rf (retention factor)	
3	Lesson 2 – Analysing chromatograms Required practical	- Explain how chromatography separates solutes. - Calculate Rf values from given data. - Use a chromatogram to determine if a sample is pure or impure.	Chromatography, Rf (retention factor)	
4	Lesson 3 – Testing for gases	- Identify hydrogen from a laboratory test. - Identify oxygen from a laboratory test. - Identify carbon dioxide from a laboratory test. - Identify chlorine from a laboratory test.		Educake Retrieval Homework
5	Lesson 4 – Tests for positive ions	- Identify a metal ion from the colour of a flame or the colour of the hydroxide precipitate. - Identify a metal ion from the colour of the hydroxide precipitate and write balanced symbol equations, including state symbols, for the production of the insoluble metal hydroxide.	Precipitate	
6	Lesson 4 – Tests for positive ions Required practicals	- Identify a metal ion from the colour of a flame or the colour of the hydroxide precipitate. - Identify a metal ion from the colour of the hydroxide precipitate and write balanced symbol equations, including state symbols, for the production of the insoluble metal hydroxide.	Precipitate	
7	Lesson 5 – Tests for negative ions (Chemistry only)	- Identify the presence of carbonate, a specific halide, or sulfate ions from simple laboratory tests. - Write balanced symbol equations, including state symbols, for the reactions in the simple laboratory tests for carbonate, halide, or sulfate ions.		Educake Retrieval Homework
8	Lesson 6 – Instrumental analysis (Chemistry only)	- Compare and contrast instrumental techniques with simple laboratory tests. - Describe the main processes of flame emission spectroscopy. - Explain how flame emission spectroscopy is an improvement on flame tests.	Instrumental analysis, Flame emission spectroscopy	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C13 The Earth’s atmosphere				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – History of our atmosphere	- Use a theory to explain in detail how the atmosphere developed. - Explain how oceans were formed.	Atmosphere	Educake Retrieval Homework
2	Lesson 2 – Our evolving atmosphere	- Describe how the proportion of carbon dioxide in the early atmosphere was reduced. - State the composition of dry air in our atmosphere now.		
3	Lesson 3 – Greenhouse gases	- Explain the greenhouse effect. - Explain how greenhouse gases increase the temperature of the atmosphere. - Explain how human activity can change the proportion of greenhouse gases in the atmosphere.	Greenhouse gases	
4	Lesson 4 – Global climate change	- Explain the possible effects of global climate change and why they are difficult to predict. - Explain possible methods to reduce greenhouse gas emissions. - Explain some of the problems in trying to reduce greenhouse gas emissions.	Climate change	
5	Lesson 5 – Atmospheric pollutants	- Explain how sulfur dioxide and nitrogen oxides are made when fossil fuels are combusted. - Describe the health impacts of atmospheric pollutants.	Atmospheric pollutants, Particulate	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C14 The Earth’s resources				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Finite and renewable resources	- Describe and classify a resource as finite or renewable when information is given. - Explain the use of natural, sustainable, and finite resources. - Interpret information from different formats including graphs, charts, tables, and prose.	Finite resource, Renewable resource	Educake Retrieval Homework
2	Lesson 2 – Water safe to drink	Explain why the method of obtaining potable water depends on the local conditions.	Filtration, Distillation	

		- Explain reasons for filtration and sterilisation in water treatment. - Describe and explain in detail how to safely distil salty water.		
3	Lesson 3 – Treating waste water	- Explain why waste water should be treated before it is released into the environment. - Describe the main processes in sewage treatment. - Explain uses of sewage slurry.		Educake Retrieval Homework
4	Lesson 3 – Treating waste water required practical	- Explain why waste water should be treated before it is released into the environment. - Describe the main processes in sewage treatment. - Explain uses of sewage slurry.		
5	Lesson 4 – Extracting metals from ores (HT only)	- Describe the processes of phytomining and bioleaching. - Write balanced symbol equations to explain metal extraction techniques. - Explain the need for new ways of extracting metals (in particular copper).	Ore, Bioleaching, Phytomining	
6	Lesson 5 – Life cycle assessments	- Explain the importance of LCA and how it can be misused. - Carry out LCAs for different products when data is supplied.	Life cycle assessment	
7	Lesson 6 – Reduce, reuse, and recycle	- Explain the importance of reusing and recycling products. - Explain why some recycling can be difficult.	Recycle	
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			

C15 Using our resources				
Lesson Number	Key Question/ Lesson Title	Learning Objective(s)	Key Words/ Concepts	Homework
1	Lesson 1 – Rusting	- Set up and interpret an experiment to investigate the conditions required for rusting to occur. - Explain how different corrosion prevention techniques work.	Rusting, Sacrificial protection, Galvanised	
2	Lesson 2 – Useful alloys	- Explain in detail why pure metals are often alloyed before they are used. - Describe how different amounts of carbon affect the properties of iron. - Identify an appropriate purpose for an alloy when given data on its properties.	Alloy, Carbon steel, Stainless steel	Educake Retrieval Homework
3	Lesson 3 – The properties of polymers	- When data about the properties of plastics are given, suggest a suitable plastic for a given purpose. - Describe different conditions used to make poly(ethene). - Explain how the structure of poly(ethene) affects its properties and therefore its use.	Polymer, Thermosoftening polymer, Thermosetting polymer	
4	Lesson 4 – Glass, ceramics, and composites	- Describe how ceramics are made. - Explain how most composites are made and name the process. - Describe how to make soda-lime glass and borosilicate glass.	Ceramics, Composites	
5	Lesson 5 – Making ammonia – the Haber process	- Describe how the raw materials are turned into the reactants for the Haber process. - Describe how the Haber process is a reversible reaction. - Describe the Haber process with the help of a balanced symbol equation including state symbols.	Haber process, Reversible reaction	Educake Retrieval Homework
6	Lesson 6 – The economics of the Haber process (HT only)	- Explain the effect of changing temperature on the yield of the Haber process. - Explain the effect of changing pressure on the yield of the Haber process. - Explain why the conditions used in the Haber process are a compromise.	Yield	
7	Lesson 7 – Making fertilisers in the lab	- Explain the importance of fertilisers for agriculture. - Describe in detail how fertilisers are produced in the laboratory. Write balanced symbol equations for the reactions to make components of ‘ammonia-based’ fertilisers in the laboratory.		
8	Lesson 8 – Making fertilisers in industry	- Describe the production of fertilisers in industry. - Write balanced symbol equations for the reactions to make components of NPK fertilisers in industry.		
	REVISION LESSON			
	ASSESSMENT LESSON			Revision HW Due
	FEEDBACK LESSON			