GCSE Chemistry (9-1)

	ATOMS & ELEMENTS	
9A	EXCELLING	9A
9B	Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes. [H]	9B
8A	Calculate the number of moles of particles in a given mass of a certain substance and vice versa. [H]	8A
8B		8B
7A		7A
7B		7B
6A	SECURING	6A
6B	Explain the difference between an atom and a molecule.	6B
5A	Identify isotopes from information about the structure of atoms.	5A
5B	Interpret formulae to identify the types of and ratio of atoms in a compound.	5B
4A	Recall that atoms can be joined together by bonds and that bonds affect the shape of a molecule.	4A
4B	Recall the charges and relative masses of the three subatomic particles.	4B
	Represent atoms, molecules of elements and simple compounds using a model.	
	State the meaning of atomic number.	
	State the meaning of mass number.	
	State what is meant by an isotope.	
	State where most of the mass of an atom is found.	
	Use the idea of atoms to explain why different elements have different physical properties.	
	Write simple chemical formulae from molecular structures.	
	Calculate the numbers of protons, neutrons and electrons using atomic numbers and mass numbers.	
	Calculate the numbers of protons, neutrons and electrons using atomic numbers and mass numbers.	
	Describe how Dalton's ideas about atoms have changed.	
	Describe how the atoms of different elements vary.	
	Describe how the size of an atom compares to the size of its nucleus.	
	Describe how the subatomic particles are arranged in an atom.	
	Explain how atoms of different elements are different.	
	Explain why all atoms have no overall charge.	
	Give a simple description of the valency of an element and use these to deduce the formula of compounds (containing two main group elements).	
	State that atoms can be joined up to make molecules or giant lattice structures.	
	State the number of electrons in an atom from its atomic number.	
	Describe the difference between molecules and giant lattice structures.	
	Explain why the relative atomic mass of many elements is not a whole	

	number. Explain the difference between an atom and an ion. Calculate the numbers of protons, neutrons and electrons in simple ions. Describe how Mendeleev predicted the existence and properties of some elements yet to be discovered. Explain how Mendeleev originally arranged the periodic table by placing the elements in order of atomic weight. Explain how new evidence has changed ideas about elements. Explain some problems Mendeleev had when ordering the elements. Interpret experimental evidence to identify elements. State what the term 'electronic configuration' means. Explain how Mendeleev's early ideas were supported by later evidence. Show electronic configurations in the form 2.8.1 and as diagrams. Explain the links between an element's position in the periodic table and its electronic configuration. Predict the electronic configurations of the elements hydrogen to calcium. Describe how the periodic table is arranged (in terms of elements in groups of similar properties). Identify a pattern of reactivity in the reaction between some alkali metals and water and use this to predict the reactivity of other alkali metals Describe how the sizes of atoms change in the groups and periods of the periodic table. Use data to identify trends in chemical properties within a group. Use data to identify trends in physical properties within a group.	
3A 3B 2A 2B 1A 1B	DEVELOPING Name compounds that contain two elements plus oxygen. Name simple compounds formed from two elements. Use a simple (Dalton's) atomic model to describe a compound. Use a simple (Dalton's) atomic model to describe an element. State the approximate size (order or magnitude) of atoms and small molecules. State the bonding that is found in molecules. Identify the chemical symbols for some common elements and vice versa. Recall that elements are often represented by symbols. Recognise some symbols for common elements. Record two-letter symbols correctly. Explain why internationally agreed symbols and conventions are necessary in science communication. Recall the chemical symbols of some common elements. Use the periodic table to look up symbols for elements. Describe how Mendeleev arranged elements into a periodic table. Describe how the elements are arranged in the modern periodic table. Explain the meaning of the term 'atomic number'.	3A 3B 2A 2B 1A 1B

	Explain why some elements have been isolated for much longer than others. Explain why some elements have been known for much longer than others. Identify the alkali metals, halogens, (transition metals) and noble gases on the periodic table. Recall the positions of metals and non-metals in the periodic table. State what elements in the same group of the periodic table share. Use ideas about the periodic table to identify the positions of metal and non-metal elements. Explain the difference between physical and chemical properties of a substance. Recall that different elements have different physical properties. Recall that the noble gases are chemically inert compared with other elements. Recall the typical properties of alkali metals. Recall the typical properties of halogens. Recall there is usually a regular gradation in chemical properties as you go down a group. Recall there is usually a regular gradation in physical properties as you go down a group. Relate the uses of different elements to their chemical properties. Relate the uses of different elements to their properties (includes magnetism). Use the reactions of some alkali metals with water to predict the reactions of other alkali metals with water (in terms of what happens, not reactivity).	
P8	PRE-GCSE Describe Dalton's ideas about atoms. State that all matter is made up of tiny particles called atoms.	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

	CHEMICAL CHANGE	
9A	EXCELLING	9A
9B	Describe what is meant by a mole of particles. [H]	9B
8A	Calculate the concentration of a solution in g dm-3	8A
8B	Calculate the number of particles in a given number of moles or mass of a substance and vice versa. [H]	8B
7A	Balance chemical equations.	7A
7B	Deduce the balanced equation for a reaction from the masses of reactants and/or products. [H]	7B
	Explain that the mass of a product formed in a reaction is controlled by the mass of reactant that is not in excess. [H]	
	Apply knowledge of explosive reactions to explain why they occur more/less rapidly when variables (proportion of fuel/oxygen mixture, the droplet size, the oxidiser) are changed.	
	Evaluate data on burning fuels to deduce the best energy per gram of fuel.	
	Evaluate the evidence used to displace the phlogiston theory of combustion.	
	Justify methods of risk reduction.	
6A	SECURING	6A
6B	Describe how atoms are rearranged in chemical reactions.	6B
	Explain the change in mass seen in reactions.	
5A	Model more complex chemical reactions using word equations.	5A
	Model simple chemical reactions using word equations	
5B	Supply missing reactants or products to complete a symbol equation.	5B
4A	Calculate the mass of product formed from a given mass of reactant, using a balanced equation.	4A
4B	Identify the products and reactants using a symbol equation.	4B
	Model simple reactions using symbol equations.	
	Use information about reaction ratios to calculate atomic masses.	
	Model more complex reactions using balanced equations.	
	Model simple reactions using balanced symbol equations.	
	Apply knowledge of explosive reactions to explain why they occur more or less rapidly when the particle size or the oxidiser is changed.	
	Describe how some explosive mixtures obtain enough oxygen to explode.	
	Describe what is meant by exothermic changes.	
	Classify (using temperature change) and explain (in terms of energy transfer) exothermic or endothermic reactions.	
	Classify changes as exothermic or endothermic from temperature changes.	
	Describe bond breaking and making in terms of energy transfer.	
	Summarise energy changes by drawing simple energy level diagrams.	
	Describe how rocket engines obtain enough oxygen in space to explode using oxidising agents.	
	Explain how neutralisation can be used to reduce pollution from fossil fuel combustion.	
	Explain how sulphur dioxide and nitrogen oxides are produced in some combustion reactions.	
	Explain how vehicle catalytic converters work (to reduce pollution from fossil fuel combustion).	
	Explain the formation of the products when hydrocarbons burn.	
	Explain the problems caused by incomplete combustion.	
	Explain the products formed by the complete and incomplete combustion of	

	hydrocarbons. Compare and contrast the oxygen and phlogiston theories for combustion	
3A	DEVELOPING	3A
3B	Describe some applications of catalysts in everyday use	3B
2A	Recall examples of chemical reactions in everyday life. Recall some examples of physical changes and of chemical changes.	2A
2B	Recall some observations that indicate a chemical reaction.	2B
1A	Recall some reactions that happen slowly and some that happen quickly.	1A
1B	Recall that temperature changes occur during many chemical reactions. State what happens to mass in a chemical reaction. Calculate the mass of a reactant needed to produce a given amount of product, using a balanced equation. Describe how catalysts affect the speed or rate of a reaction. Explain how chemical reactions are different to physical changes. Explain the law of conservation of mass in a closed system. Explain the law of conservation of mass in a non-enclosed system. Identify the products and reactants using a word equation. Interpret a word equation to identify the products and reactants in a chemical reaction. Supply missing reactants or products to complete a word equation. Use observations to decide whether a chemical or physical change has taken place. Use observations to decide whether a chemical reaction has taken place. Describe examples of energy being used to start a chemical reaction or keep it going. Recall examples of energy being used to start a chemical reaction or keep it going. Explain why energy input may be needed to start some reactions or keep them going. State the meaning of: fuel, combustion State the meaning of hydrocarbon Compare the temperature rise of water when some fuels are burnt. Describe the combustion of hydrocarbons (in terms of reactants and products). Describe the combustion of hydrocarbons (in terms of reactants and products). Describe the tests for carbon dioxide and water. Describe how to stay safe in familiar situations. Describe the difference between substances that are corrosive or irritants. Describe what the main hazard symbols mean. Recognise common hazards when in the lab and suggest ways of ensuring they do not cause harm. Describe the use and importance of the Hazchem code. Explain why different types of fire need to be put out in different ways. Use the idea of the 'fire triangle' to explain how to extinguish a fire.	1B
P8	PRE-GCSE	P8
P7	Name the three sides of the fire triangle. Recall the purpose of hazard symbols.	P7
P6	Recognise hazard symbols.	P6
P5	Recognise the hazard symbols for: dangerous to the environment, corrosive, toxic, explosive, flammable, caution.	P5
P4	Describe the test for carbon dioxide.	P4
P3	Describe the test for hydrogen.	P3
P2	State the meaning of hazard. Recall the fuel used in a fuel cell.	P2
P1	Describe the test for oxygen.	P1

	EARTH & ATMOSPHERIC SCIENCES	
9A	EXCELLING	9A
9B	Evaluate the environmental effects of quarrying and mining.	9B
8A	Explain how atmospheric gases help to cause the greenhouse effect.	8A
8B	Explain why biomagnification of toxins can occur Evaluate the contribution made by combustion to the amount of carbon dioxide in the air in the [short, medium, long] term.	8B
7A	Explain the link between CFCs and skin cancer and how the problem can be solved.	7A
7B	Decide how responsibility for cutting emissions should be shared. Compare quantitative data about the effect of speed on the size of grain that can be transported.	7B
6A	SECURING	6A
6B	Explain why the method used to extract a metal is related to its position in the reactivity series and cost of the extraction process.	6B
5A	Explain how carbon dioxide helps to cause the greenhouse effect. Explain how human activity affects the levels of carbon dioxide in the atmosphere.	5A
5B	Explain how methods of controlling the levels of carbon dioxide work.	5B
4A	Explain how sulphur dioxide and nitrogen oxides help to cause acid rain. Explain how sulphur dioxide and nitrogen oxides help to cause acid rain.	4A
4B	Explain the effects of acid rain on organisms, bodies of water. Evaluate the link between global temperature and levels of carbon dioxide in the atmosphere. Evaluate ways in which pollution from non-metal oxides can be reduced. Compare the densities of igneous rocks and relate them to the minerals contained in the rocks. Explain the variation in crystal size in an igneous intrusion, in terms of cooling rate. Use the rock cycle model to link the formation of igneous, sedimentary and metamorphic rocks. Evaluate the efficacy of recycling of different sorts of materials.	4B
3A	DEVELOPING	3A
3B	Recall how metals are extracted from ores taken from the Earth's crust.	3B
2A	Recall how some elements are found in their native states. Describe how metals are extracted from their ores by heating with carbon or electrolysis.	2A
2B	Recall that the extraction of some metals is more difficult than others, depending on the metal’s reactivity.	2B
1A	Recall examples of non-metal oxide pollutants caused by burning fossil fuels and their impurities.	1A
1B	Recall examples of pollutants released by burning fossil fuels and impurities in fuels. Recall reasons why the temperature on the Earth varies over time. Recall some effects of global warming, climate change. State the meaning of the greenhouse effect. Describe the properties and uses of chlorofluorocarbons (CFCs). Suggest ways of reducing the greenhouse effect on Earth. Describe the textures and properties of igneous and metamorphic rocks.	1B

	Describe the textures and properties of sedimentary rocks. Describe how igneous rocks are formed. Describe how magma can be erupted to form volcanoes. Describe how metamorphic rocks are formed. Explain why certain rocks are porous and/or permeable. Explain why certain rocks are used for certain applications. Appreciate the different timescales involved in different rock cycle processes, and give examples of fast and slow processes. Describe how fossils are formed. Describe how sedimentary rocks are formed. Explain how the size of crystals in igneous rocks is evidence for the speed of cooling, and describe some factors that affect this. Explain why crystal size depends on the speed of cooling. Use crystal size to classify igneous rocks as intrusive and extrusive. Describe how concrete and paper can be recycled. Describe how glass can be recycled. Describe how metals can be recycled. Explain what a landfill site is and some of the problems they cause. Explain the advantages of recycling materials. Explain the advantages of recycling metals. Describe how weathering can break up rocks. Describe the effect of chemical weathering on rocks. Describe the effect of physical and biological weathering on rocks. Explain why rainwater is slightly acidic. Recall how weathered rocks are eroded and explain how fragments get worn down during transport. Compare the fragment sizes that can be transported by wind, water and ice. Describe features in limestone landscapes and relate them to the way they were formed. Describe the link between the size of rock fragments carried and the water speed. Describe the link between the size of rock fragments deposited and the water or wind speed. Relate features of a landscape to the type of rock and how it has weathered. Relate the grain size and roundness to transport history.	
P8	PRE-GCSE Recall some examples of rocks with different textures. Recall some uses for rocks and some products made from limestone. Recall why different rocks have different properties. Appreciate that the properties of waste materials determine their disposal. Recall that metals can be recycled. State the meaning of: biodegradable, non-biodegradable. Recall that the Earth consists of a core, mantle and crust. Recall the names of some igneous and metamorphic rocks. Recall the names of some sedimentary and metamorphic rocks Recall what earthquakes and volcanoes are. State what rocks are made of.	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

	MATERIAL SCIENCE	
9A	EXCELLING	9A
9B	Explain how the properties of a substance depend on the bonding and arrangement of atoms (in terms of strength and number of bonds only).	9B
8A	Explain why modifications in a certain ceramic, glass manufacture can change its properties (e.g. lead crystal). (Involves consideration of type and arrangement of atoms.)	8A
8B	Plot and interpret graphs of melting point or boiling point for mixtures of varying compositions.	8B
7A		7A
7B		7B
6A	SECURING	6A
6B	Justify the use of a ceramic material for a given application.	6B
5A	Explain why modifications in a certain composite, paper, concrete manufacture can change its properties.	5A
5B	Justify the use of a composite material for a given application.	5B
4A	Identify the monomer structures in a given polymer chain.	4A
4B	Explain how some of the problems of artificial polymers can be overcome.	4B
	Model the formation of poly(ethene) using equations, symbols and particle diagrams.	
	Use models to explain why converting pure metals into alloys often increases the strength of the product.	
3A	DEVELOPING	3A
3B	Explain how the properties of ceramics make them useful.	3B
2A	Recall some examples of common composites (e.g. plywood, paper, concrete)	2A
2B	State the meaning of composite.	2B
1A	Explain how the properties of composites make them useful.	1A
1B	Recall that crude oil is the primary source of raw materials for the plastics industry.	1B
	Link the properties of common plastics to their uses.	
	Recall some problems with the disposal of artificial polymers.	
	Recall the names of some common artificial and natural polymers.	
	Recall what happens when monomers polymerise.	
	State that a pure material has a fixed melting point and boiling point.	
	Describe some ways in which purity is stated.	
	Explain why metals are often alloyed with other elements.	
	Identify a pure substance from its melting or boiling point.	
P8	PRE-GCSE	P8
P7	State the meaning of: ceramic.	P7
P6	Recall examples of common insulators and conductors.	P6
P5	Recall some examples of common ceramics (e.g. pottery, glass).	P5
P4	Recall that different materials have different properties.	P4
P3	State the meaning of: alloy.	P3
P2	State what is meant by: pure.	P2
P1		P1

	MIXTURES	
9A	EXCELLING	9A
9B	Evaluate the hazards and control the risks present when purifying water. Explain how fractional distillation is used in making perfumes.	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A	SECURING	6A
6B	Explain, in terms of atoms and particles, how air is a mixture of elements, compounds, atoms and molecules.	6B
5A	Describe how to carry out fractional distillation. Distinguish between simple distillation and fractional distillation.	5A
5B	Evaluate the information provided by chromatograms. Identify when fractional distillation should be used to separate a mixture.	5B
4A	Explain how the products of fractional distillation are linked to the boiling points of the components.	4A
4B		4B
3A	DEVELOPING	3A
3B	State some mixtures that can be separated by crystallisation.	3B
2A	State some mixtures that can be separated by filtration. State the meaning of: sieving, filtering, insoluble, suspension.	2A
2B	Recall the general rules for the solubility of common substances in water.	2B
1A	Describe what happens when a liquid will not dissolve any more of a solid and use correctly the terms: solubility, saturated solution.	1A
1B	Classify colloids as foams, emulsions, gels and aerosols, based on what they are made up of. Classify mixtures as suspensions, colloids and solutions, based on what they look like and whether they separate on standing. Use melting point information to decide whether a substance is pure or is a mixture. Describe what happens to atoms at a pure substance's melting point. Explain the differences between elements, compounds and mixtures (with reference to elements being substances that cannot be broken down into anything simpler by chemical means). Describe how fresh water can be produced from seawater. Describe how insoluble solids can be separated from a liquid. Describe how some mixtures can be separated by chromatography. Describe how to carry out, and explain what happens in, simple distillation. Describe the steps needed to make fresh water suitable for drinking. Explain how mixtures are separated by filtration. Explain ways of reducing risk when separating mixtures by filtration and crystallisation. Explain why water used in chemical analysis must not contain dissolved salts. Give examples of where chromatography is used, and describe how chromatography is used to separate mixtures. Give examples of where distillation is used, and describe how distillation can separate mixtures. Identify factors that could affect distillation. Identify pure substances and mixtures on chromatograms. Identify substances that are identical on chromatograms. Suggest how to purify water when you know what it contains. Calculate Rf values and use them to identify substances. Draw and interpret diagrams showing how chromatography is done. Draw and interpret diagrams showing how filtration and crystallisation are done.	1B

	Explain how chromatography works, and interpret a chromatogram. Explain how distillation works. Explain how substances can be separated by chromatography. Explain the formation of crystals during crystallisation. Explain what precautions are needed to reduce risk in a distillation experiment. Justify the decision to separate a mixture in a certain way. Describe how factors affect how much of a substance dissolves. Describe how some solids can be used to form a solution, and identify the solvent and solute in a solution. Describe how we know that different solutes have different solubilities. Plan a fair test to discover how different factors affect the solubility of a substance. Describe how to prepare a pure, dry sample of an insoluble salt. Justify the decision to separate a solution in a certain way. Name the precipitate formed in a reaction. Predict whether or not a precipitate will form from two solutions. Use a knowledge of dissolving to decide how mixtures should be separated.	
P8	PRE-GCSE Describe the differences between a pure substance and a mixture. Identify mixtures. Recall the names of the most important gases that are mixed together in air. State the meaning of: mixture. Describe what is seen when a solid dissolves, and correctly use the terms: soluble, solute, solvent, solution.	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

	STRUCTURE, BONDING & THE PROPERTIES OF MATTER	
9A	EXCELLING	9A
9B	Describe the relationship between hydrogen ion concentration and pH. [H]	9B
8A	Explain the difference between a dilute and concentrated solution (in terms of the amount of solute present). [H]	8A
8B	Explain how the pH and reactivity of an acid depend on the concentration and the strength of the acid. [H]	8B
7A	Describe how to produce a solution that is only a salt and water using the reaction between an acid and an alkali or insoluble base.	7A
7B	Evaluate the effectiveness of different indicators. Explain the difference between strong and weak acids (in terms of the degree of dissociation of the acid molecules). [H] Explain the link between pH and the concentration of ions in acids and alkalis. [H] Describe Brownian motion. State where Brownian motion can be observed. Use valencies to deduce the formula of simple two element compounds including transition metals Write balanced equations for displacement reactions. Write balanced ionic equations. [H]	7B
6A	SECURING	6A
6B	Describe how to carry out an acid-alkali titration.	6B
5A	Explain why litmus is purple in neutral solutions. Explain why titration is used to prepare soluble salts. Plot and interpret graphs of pH against volume of acid or alkali added in a neutralisation reaction.	5A
5B	Write word equations for the reactions of acids and metal oxides.	5B
4A	Use information about indicator colour changes to design different indicators for different purposes.	4A
4B	Write symbol equations for the reactions of acids and metal oxides. Explain the difference between an atom and an ion. Calculate the numbers of protons, neutrons and electrons in simple ions. Describe how the different types of bonds and structures are formed. Describe the basic differences between covalent, simple molecules and giant covalent structures. Explain how covalent bonds are formed. Explain why ionic compounds conduct electricity when they are molten and in aqueous solution. Explain why ionic compounds do not conduct electricity as solids. Explain why ionic compounds have high melting points and high boiling points. Describe the structure of ionic compounds. Explain how ionic compounds are held together. Explain how the structure and bonding of a substance is linked to its physical properties. (Relative melting point and boiling point, relative solubility in water and ability to conduct electricity, as solids and in solution.) Explain the formation of covalent bonds using dot and cross diagrams. Explain why we use models to represent structure and bonding. Represent structures and bonding using a variety of different models (dot and cross, ball and stick, 2D, 3D). Use dot and cross diagrams to explain how ionic bonds are formed. Describe the limitations of the different models used to represent structure and	4B

	bonding (dot and cross, ball and stick, 2D, 3D). Explain the properties and uses of diamond and graphite in terms of their structure and bonding. Explain the properties of fullerenes and graphene in terms of their structure and bonding. Explain why the energy of particles changes during changes of state. Explain why the movement and arrangement of particles change during changes of state. Explain why the temperature does not change as a pure substance melts. Interpret the use of –ide and –ate endings in the names of compounds. Name ionic compounds using –ide and –ate endings. Explain how cations and anions are formed. Work out the formula of an ionic compound from the formulae of its ions. Explain the formation of ions in groups 1, 2, 6 and 7 of the periodic table. Apply knowledge of thermal decomposition in carbonates to other compounds. Deduce the empirical formula from a molecular formula. Describe an experiment to determine the empirical formula for a compound. Describe the structures of diamond, graphite, fullerenes and graphene. Explain how barrier methods protect iron from rust. Explain the general reaction between an acid and a metal carbonate to produce a salt, water and carbon dioxide. Explain the general reaction between an acid and a metal to produce a salt and hydrogen. Explain why a displacement reaction may or may not occur. Explain why metals are malleable. Explain why metals conduct electricity. Identify ionic compounds from data about their properties. Model simple oxidation reactions using word equations. Model simple reactions of metals and acids using word equations. Model simple reactions of metals and non-metals using word equations. Model simple reactions of metals and water using word equations. Name the compounds formed by a reaction between a metal and a non-metal. Use information on the reactions of metals with acids to place them in an order of reactivity. Use information on the reactions of metals with water to place them in an order of reactivity. Use information on the reactivity of metals to place them in an order of reactivity. Calculate the empirical formula of a compound from the masses of the elements it contains. Calculate the relative formula mass of a substance from relative atomic masses. Compare the physical and chemical properties of metal and non-metal oxides. Deduce the molecular formula for a compound from its empirical formula and its relative formula mass. Explain the difference between an empirical formula and a molecular formula. Interpret formulae to identify the types of and ratio of atoms in a compound. Use evidence to decide whether a displacement reaction has or has not occurred. Use ideas about reactivity to explain how sacrificial metals can protect iron from rusting. Use results from displacement reactions to produce an order of reactivity. Write and derive the formulae for common acids and simple salts, given the ratios of atoms or the formulae of reactants. Describe the structure of a polymer.	

	Explain why covalent, simple molecular compounds have low melting and boiling points. Explain why covalent, simple molecular compounds are poor conductors of electricity. Carry out a calculation to work out the speed of diffusion. Convert metres to nanometres and vice versa. Explain how barometers work. Explain how Brownian motion occurs, using particle theory. Explain how diffusion occurs in terms of movement of particles. Explain how evidence from Brownian motion is used to support the particle theory. Explain some of the effects of air pressure (e.g. using a straw, collapsing can). Explain the ways in which gas pressure can be increased (more particles introduced into a container, container is made smaller, gas is heated). Explain why the speed of diffusion in gases is faster than in liquids. Interpret particle models of mixtures, atoms, molecules, elements and compounds. Recall suitable units to measure particle diameters. Use the kinetic theory to explain why gas pressure increases or decreases as the temperature, number of particles or volume changes. Use the particle model to explain other observations about matter. Use the particle theory to explain the properties of solids, liquids and gases. Compare particle sizes to the sizes of common objects. Identify relationships showing direct and inverse proportion by analysis of graphs involving pressure, volume and/or temperature.	
3A	DEVELOPING	3A
3B	Describe how to reduce the risk from acids by dilution. Name the ions present in all acidic and all alkaline solutions.	3B
2A	Recall examples of everyday substances that are acids.	2A
2B	Recall examples of everyday substances that are alkalis. Recall that alkalis are soluble bases.	2B
1A	Recall the colour changes associated with litmus indicator.	1A
1B	Correctly use the term: base. Describe how a base reacts in a neutralisation reaction. Describe how indicators are used to distinguish between acidic, alkaline and neutral solutions. Describe how universal indicator is used to distinguish between acidic, alkaline and neutral solutions. Describe solutions as being more or less acidic/alkaline by comparing their pHs. Describe the effect of acids and alkalis on common indicators. Describe the main features of the pH scale (numbered scale that shows how acidic or alkaline a solution is, with solutions below pH 7 being acidic, those above pH 7 being alkaline and those at pH 7 being neutral). Describe the safety precautions that should be observed when handling different acids and alkalis. Describe the use of universal indicator and pH meters to determine the pH of a solution. Recall some applications of neutralisation (antacids, toothpastes, treating waste gases, rust removal). Recall some applications of neutralisation (changing the pH of soils). Recall that acids react with alkalis and this is called neutralisation. State the pH values associated with acidic, alkaline and neutral solutions. Use solutions of known acidity/alkalinity in order to deduce a colour chart for an indicator. Apply ideas about the pH scale to explain the changes that take place on neutralisation and dilution. Describe the reactions of acids with alkalis. Describe the reactions of acids with bases. Describe the steps involved in preparing a soluble salt from an acid and an insoluble reactant. Describe what happens when an acid reacts with a metal oxide.	1B

Explain how everyday examples of neutralisation are useful (antacids, toothpastes, treating waste gases, rust removal, changing the pH of soils).
Explain what happens during a neutralisation reaction.
Explain what happens to the ions from acids and alkalis during neutralisation.
"Explain why

- an excess of insoluble reactant is used when preparing a soluble salt
- the excess reactant is removed when preparing a soluble salt

the remaining solution contains only a salt and water, when preparing a soluble salt from an acid and an insoluble reactant."
State the approximate size (order or magnitude) of atoms and small molecules.
State the bonding that is found in molecules.
State what happens at a material's boiling point.
State what happens at a material's melting, freezing and boiling points.
State what happens to mass in a physical change.
Describe how impurities alter melting, freezing and boiling points.
Use knowledge of melting/freezing and boiling point to predict the state of a substance at a given temperature
Interpret a heating curve to identify a melting point.
Describe the evidence needed to decide whether an element is a metal or a non-metal.
Identify metals and non-metals by their physical properties.
Describe the corrosion of metals by reactions with oxygen.
Describe the properties of ionic compounds.
Describe the reactions of different metals with water.
Describe the reactions of metals with acids.
Describe the reactions of metals with oxygen.
Describe the reactions of non-metals with oxygen.
Describe what happens during thermal decomposition of a metal carbonate.
Recall some allotropes of carbon.
Recall ways in which iron can be prevented from rusting.
Recall which salts are produced by which acids.
State the meaning of: oxidation.
State the meaning of: rusting.
Describe the movement of ions in electrolysis.
Describe what happens when a given displacement reaction occurs.
Explain how oxidation and reduction happen during electrolysis.
Explain the products formed by the oxidation of metals.
Explain what happens in oxidation and reduction.
Give examples of ionic; covalent, simple molecular; covalent, giant molecular; and metallic substances.
Identify and explain the products formed by the oxidation of metals.
Identify and explain the products formed by the reactions of metals with water.
Identify thermal decomposition reactions.
Recall the chemical formulae of some common compounds.
Recall the formulae of common polyatomic ions, and the charges on them.
Recall the formulae of simple ions.
State the meaning of displacement reaction.
State the meaning of reactivity series.
Use evidence to classify unfamiliar materials as being one of: metal elements, metallic, non-metal elements, non-metallic.
Describe the properties of diamond, graphite, fullerenes and graphene.
Recall examples of common covalent, simple molecular compounds.
Recall the names of some common molecular compounds.
Recall the names of some common molecular elements.
Describe the general properties of covalent, simple molecular compounds.
Describe diffusion as the movement of one substance through another without any external mixing.
Describe how moving gas particles cause pressure when they hit the walls of their container.

	Describe what a vacuum is. Recall some everyday examples of diffusion. Recognise examples of diffusion causing problems. Recognise some effects of pressure (e.g. blowing up a balloon). State that all materials are made from particles. Use the kinetic theory to describe the cause of gas pressure. Describe how the movement and spacing of the particles is different in solids, liquids and gases. Describe how the pressure of gases in containers can be increased or decreased. Describe the particles and how they are arranged in metals. Describe, draw and recognise the arrangement of particles in solids, liquids and gases. Explain that more particles in a container will cause a greater pressure. Make a prediction about diffusion. Appreciate that some substances are difficult to categorise. Describe the properties of the three states of matter in terms of shape, volume and compressibility. Describe the arrangements and movement of particles in the different states of matter. Describe the relative energies of particles in the different states of matter. Use information to predict the state of a substance.	
P8	PRE-GCSE Describe what the three states of matter are like. Name the three states of matter, and the physical changes that occur between them. Classify materials as solids, liquids and gases. Group materials using their states of matter as justification. Recall the three states of matter and identify solids, liquids, gases. Record observations and describe simple properties of the three states of matter. Recall and use state symbols.	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1