AQA GCSE Combined Science: Trilogy
Topic Checklists

5.2 Bonding, Structure and the Properties of Matter

5.2.1 Chemical Bonds, Ionic, Covalent and Metallic				
Topic	**Success Criteria**	**Progress**		
Chemical Bonds	I can name the three types of strong chemical bonds.			
	I can describe how the different types of bonds join particles together.			
	I can state the types of elements that ionic bonding occurs between.			
	I can state the types of elements that covalent bonding occurs between.			
	I can state the types of elements that metallic bonding occurs between.			
	I can explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons.			
Ionic Bonding	I can describe what happens to the atoms involved when ionic bonds are formed.			
	I can draw dot and cross diagrams to represent the electron transfer during the formation of ionic compounds by metals in Groups 1 and 2 with non-metals in Groups 6 and 7.			
	I can work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7.			
Ionic Compounds	I can describe how ionic compounds are held together.			
	I can deduce that a compound is ionic from a diagram of its structure.			
	I can describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure.			
	I can work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure.			
	I am familiar with the structure of sodium chloride.			

Topic	Success Criteria	Progress		
Covalent Bonding	I can describe how covalent bonds are formed.			
	I can recognise common substances that consist of small molecules from their chemical formula.			
	I can recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding.			
	I can draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane.			
	I can represent the covalent bonds in a small molecule, using a line to represent a single bond.			
	I can represent the covalent bonds in the repeating units of a polymer, using a line to represent a single bond.			
	I can represent the covalent bonds in a part of a giant covalent structure, using a line to represent a single bond.			
	I can describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent molecules or giant structures.			
	I can deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule.			
Metallic Bonding	I can describe how the atoms are arranged in a metal.			
	I can explain how the sharing of delocalised electrons gives rise to strong metallic bonds.			
	I can recognise substances as metallic giant structures from diagrams showing their bonding.			

5.2.2 How Bonding and Structure Are Related to the Properties of Substances				
Topic	**Success Criteria**	**Progress**		
The Three States of Matter	I can name the three states of matter.			
	I can name the changes of state that take place at the melting point of a substance.			
	I can name the changes of state that take place at the boiling point of a substance.			
	I can represent the three states of matter using a simple particle model.			
	I can explain melting, boiling, freezing and condensing using particle theory.			
	I can describe how the amount of energy needed to change the state of a substance relates to the strength of the forces between the particles of the substance.			
	(HT only) I can describe the limitations of the particle model being used to represent the three states of matter.			
	I can predict the states of substances at different temperatures given appropriate data.			
	I can explain the different temperatures at which changes of state occur in terms of energy transfers and types of bonding.			
	I can recognise that atoms themselves do not have the bulk properties of materials.			
	(HT only) I can explain the limitations of the particle theory in relation to changes of state.			
State Symbols	I can recall the state symbols used in chemical equations to represent the three states of matter and aqueous solutions.			
	I can include appropriate state symbols when writing chemical equations.			
Properties of Ionic Compounds	I can describe the structure of ionic compounds.			
	I can explain why ionic compounds have high melting points and high boiling points.			
	I can explain why ionic compounds conduct electricity when melted or dissolved in water.			
Properties of Small Molecules	I can describe the general properties of small molecules.			
	I can explain what happens when a substance consisting of small molecules melts or boils.			
	I can explain why larger molecules have higher melting and boiling points.			
	I can explain why small molecules do not conduct electricity.			

Topic	Success Criteria	Progress		
Polymers	I can describe how the atoms in a polymer are linked to other atoms.			
	I can explain why polymers are solids at room temperature.			
	I can recognise polymers from diagrams showing their bonding and structure.			
Giant Covalent Structures	I can give some examples of giant covalent structures.			
	I can describe the general properties of giant covalent structures.			
	I can describe how the atoms in a giant covalent structure are linked to other atoms.			
	I can explain what must happen to the bonds in order to melt or boil a giant covalent structure.			
	I can recognise giant covalent structures from diagrams showing their bonding and structure.			
Properties of Metals and Alloys	I can describe the structure of metals.			
	I can explain why most metals have high melting and boiling points.			
	I can explain why metals can be bent and shaped.			
	I can explain why pure metals are mixed with other elements to make alloys.			
	I can explain why alloys are harder than pure metals.			
Metals as Conductors	I can explain why metals are good conductors of electricity.			
	I can explain why metals are good conductors of thermal energy.			

5.2.3 Structure and Bonding of Carbon				
Topic	**Success Criteria**	**Progress**		
Diamond	I can describe the bonding between the carbon atoms in diamond.			
	I can explain the properties of diamond in terms of its structure and bonding.			
Graphite	I can describe the bonding between the carbon atoms in graphite.			
	I can explain the properties of graphite in terms of its structure and bonding.			
	I can describe the properties that make graphite similar to metals.			
Graphene and Fullerenes	I can describe the structure of graphene.			
	I can explain how the properties of graphene make it useful in electronics and composites.			
	I can explain the properties of graphene in terms of its structure and bonding.			
	I can describe the structure of fullerenes.			
	I can name and give the formula of the first fullerene to be discovered.			
	I can describe the structure of carbon nanotubes.			
	I can explain how the properties of carbon nanotubes make them useful for nanotechnology, electronics and materials.			
	I can recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure.			
	I can give examples of the uses of fullerenes, including carbon nanotubes.			