



# KS4 Science Curriculum Plan

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Year 10 Curriculum		GCSE Combined Science Trilogy
Biology Subject Content: B1	Chemistry Subject Content: C1	Physics Subject Content: P1
<p><u>CELL BIOLOGY</u> Cell structure:</p> <ul style="list-style-type: none"> <li>Eukaryotes and prokaryotes</li> <li>Animal and plant cells</li> <li>Cell specialisation</li> <li>Cell differentiation</li> <li>Microscopy</li> </ul> <p>Cell Division:</p> <ul style="list-style-type: none"> <li>Chromosomes</li> <li>Mitosis and the cell cycle</li> <li>Stem cells</li> </ul> <p>Transport in cells:</p> <ul style="list-style-type: none"> <li>Diffusion</li> <li>Osmosis</li> <li>Active Transport</li> </ul> <p><u>ORGANISATION</u> Principles of organisation</p> <p>Animal tissues, organs and organ systems:</p> <ul style="list-style-type: none"> <li>The human digestive system</li> <li>The heart and blood vessels</li> <li>Blood</li> <li>Coronary heart disease</li> </ul>	<p><u>ATOMIC STRUCTURE AND THE PERIODIC TABLE</u> A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes:</p> <ul style="list-style-type: none"> <li>Atoms, elements and compounds</li> <li>Mixtures</li> <li>The development of the model atom</li> <li>Relative electrical charges of subatomic particles</li> <li>Size and mass of atoms</li> <li>Relative atomic mass</li> <li>Electronic structure</li> </ul> <p>The Periodic Table:</p> <ul style="list-style-type: none"> <li>Introduction to the Periodic Table</li> <li>Development of the Periodic Table</li> <li>Metals and non-metals</li> <li>Group 0</li> <li>Group 1</li> <li>Group 7</li> </ul> <p><u>BONDING, STRUCTURE AND THE PROPERTIES OF MATTER</u></p>	<p><u>ENERGY</u> Energy changes in a system, and the ways energy is stored before and after such changes:</p> <ul style="list-style-type: none"> <li>Energy stores and systems</li> <li>Changes in energy</li> <li>Energy changes in systems</li> <li>Power</li> </ul> <p>Conservation and dissipation of energy:</p> <ul style="list-style-type: none"> <li>Energy transfers in a system</li> <li>Efficiency</li> <li>National and global energy resources</li> </ul> <p><u>ELECTRICITY</u> Current, potential difference and resistance:</p> <ul style="list-style-type: none"> <li>Standard circuit diagram symbols</li> <li>Electrical charge and current</li> <li>Current, resistance and potential difference</li> <li>Resistors</li> <li>Series and parallel circuits</li> </ul> <p>Domestic uses and safety:</p>

<ul style="list-style-type: none"> <li>• Health issues</li> <li>• The effect of lifestyle on some noncommunicable diseases</li> <li>• Cancer</li> </ul> <p>Plant tissues, organs and systems:</p> <ul style="list-style-type: none"> <li>• Plant tissues</li> <li>• Plant organ system</li> </ul> <p><u>INFECTION AND RESPONSE</u> Communicable Diseases:</p> <ul style="list-style-type: none"> <li>• Communicable diseases</li> <li>• Viral diseases</li> <li>• Bacterial diseases</li> <li>• Fungal diseases</li> <li>• Protist diseases</li> <li>• Human defence mechanisms</li> <li>• Vaccination</li> <li>• Antibiotics and painkillers</li> <li>• Discover and development of drugs</li> </ul> <p><u>BIOENERGETICS</u> Photosynthesis:</p> <ul style="list-style-type: none"> <li>• Photosynthetic reaction</li> <li>• Rate of photosynthesis</li> <li>• Uses of glucose from photosynthesis</li> <li>• Aerobic and anaerobic respiration</li> <li>• Response to exercise</li> <li>• Metabolism</li> </ul>	<p>Chemical bonds, ionic, covalent and metallic:</p> <ul style="list-style-type: none"> <li>• Chemical bonds</li> <li>• Ionic bonding</li> <li>• Ionic compounds</li> <li>• Covalent bonding</li> <li>• Metallic bonding</li> </ul> <p>How bonding and structure are related to properties of substances:</p> <ul style="list-style-type: none"> <li>• The three states of matter</li> <li>• State symbols</li> <li>• Properties of ionic compounds</li> <li>• Properties of small molecules</li> <li>• Polymers</li> <li>• Giant covalent structures</li> <li>• Properties of metals and alloys</li> <li>• Metals as conductors</li> </ul> <p>Structure and bonding of carbon:</p> <ul style="list-style-type: none"> <li>• Diamond</li> <li>• Graphite</li> <li>• Graphene and fullerenes</li> </ul> <p><u>QUANTITATIVE CHEMISTRY</u></p> <p>Chemical measurements, conservation of mass and the quantitative interpretation of chemical equations:</p> <ul style="list-style-type: none"> <li>• Conservation of mass and balanced chemical equations</li> <li>• Relative formula mass</li> <li>• Mass changes when a reactant or product is a gas</li> <li>• Chemical measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Direct and alternating potential difference</li> <li>• Mains electricity</li> </ul> <p>Energy transfers:</p> <ul style="list-style-type: none"> <li>• Power</li> <li>• Energy transfers in everyday appliances</li> <li>• The National Grid</li> </ul> <p><u>PARTICLE MODEL OF MATTER</u></p> <p>Changes of state and the particle model:</p> <ul style="list-style-type: none"> <li>• Density of materials</li> <li>• Changes of state</li> </ul> <p>Internal energy and energy transfers:</p> <ul style="list-style-type: none"> <li>• Internal energy</li> <li>• Temperature changes in a system and specific heat capacity</li> <li>• Changes of heat and specific latent heat</li> </ul> <p>Particle model and pressure:</p> <ul style="list-style-type: none"> <li>• Particle motion in gases</li> </ul> <p><u>ATOMIC STRUCTURE</u> Atoms and Isotopes:</p> <ul style="list-style-type: none"> <li>• The structure of an atom</li> <li>• Mass number, atomic number and isotopes</li> <li>• The development of the model of the atom</li> </ul> <p>Atoms and Nuclear radiation:</p> <ul style="list-style-type: none"> <li>• Radioactive decay and nuclear radiation</li> <li>• Nuclear equations</li> </ul>
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Use of amount of substances in relation to masses of pure substances:

- Moles
- Amounts of substances in equations
- Using moles to balance equations
- Concentration of solutions

### CHEMICAL CHANGES

Reactivity of metals:

- Metal oxides
- The reactivity series
- Extraction of metals and reduction
- Oxidation and reduction in terms of electrons

Reactions of acids:

- Reactions of acids and metals
- Neutralisation of acids and salt production
- Soluble salts
- The pH scale and neutralisation
- Strong and weak acids

Electrolysis:

- The process of electrolysis
- Electrolysis and molten ionic compounds
- Using electrolysis to extract metals
- Electrolysis of aqueous solutions
- Representation of reactions at electrodes as half equations

### ENERGY CHANGES

Exothermic and Endothermic Reactions:

- Energy transfer during exothermic and endothermic reactions

- Half-lives and the random nature of radioactive decay
- Radioactive contamination

	<ul style="list-style-type: none"> <li>• Reaction profiles</li> <li>• The energy change of reactions</li> </ul>	
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Year 11 Curriculum		GCSE Combined Science Trilogy
Biology Subject Content: B2	Chemistry Subject Content: C2	Physics Subject Content: P2
<p><u>HOMEOSTASIS AND RESPONSE</u> Homeostasis</p> <p>The human nervous system</p> <p>Hormonal Coordination:</p> <ul style="list-style-type: none"> <li>• Human endocrine system</li> <li>• Control of blood glucose concentration</li> <li>• Hormones in human reproduction</li> <li>• Contraception</li> <li>• The use of hormones to treat infertility</li> <li>• Negative feedback</li> </ul> <p><u>INHERITANCE, VARIATION AND EVOLUTION</u> Reproduction:</p> <ul style="list-style-type: none"> <li>• Sexual and asexual reproduction</li> <li>• Meiosis</li> <li>• DNA and the genome</li> <li>• Genetic inheritance</li> <li>• Inherited disorders</li> <li>• Sex determination</li> </ul> <p>Variation and evolution:</p> <ul style="list-style-type: none"> <li>• Variation</li> <li>• Evolution</li> <li>• Selective breeding</li> <li>• Genetic engineering</li> </ul>	<p><u>THE RATE AND EXTENT OF CHEMICAL CHANGE</u> Rate of Reaction:</p> <ul style="list-style-type: none"> <li>• Calculating rates of reaction</li> <li>• Factors which affect the rates of chemical reactions</li> <li>• Collision theory and activation energy</li> <li>• Catalysts</li> </ul> <p>Reversible reactions and dynamic equilibrium:</p> <ul style="list-style-type: none"> <li>• Reversible reactions</li> <li>• Energy changes and reversible reactions</li> <li>• Equilibrium</li> <li>• The effect of changing conditions on equilibrium</li> <li>• The effect of changing concentration</li> <li>• The effect of temperature changes on equilibrium</li> <li>• The effect of pressure changes on equilibrium</li> </ul> <p><u>ORGANIC CHEMISTRY</u> Carbon compounds as fuels and feedstock:</p> <ul style="list-style-type: none"> <li>• Crude oil, hydrocarbons and alkanes</li> </ul>	<p><u>FORCES</u> Forces and their interactions:</p> <ul style="list-style-type: none"> <li>• Scalar and vector quantities</li> <li>• Contact and non-contact forces</li> <li>• Gravity</li> <li>• Resultant forces</li> </ul> <p>Work done and energy transfer</p> <p>Forces and elasticity</p> <p>Forces and Motion:</p> <ul style="list-style-type: none"> <li>• Describing motion along a line</li> <li>• Forces, accelerations and Newton's Laws of motion</li> <li>• Forces and braking</li> </ul> <p>Momentum:</p> <ul style="list-style-type: none"> <li>• Momentum is a property of moving objects</li> <li>• Conservation of momentum</li> </ul> <p><u>WAVES</u> Waves in air, fluids and solids:</p> <ul style="list-style-type: none"> <li>• Transverse and longitudinal waves</li> <li>• Properties of waves</li> </ul> <p>Electromagnetic Waves:</p> <ul style="list-style-type: none"> <li>• Types of electromagnetic waves</li> </ul>

<p>The development of understanding of genetics and evolution:</p> <ul style="list-style-type: none"> <li>• Evidence of evolution</li> <li>• Fossils</li> <li>• Extinction</li> <li>• Resistant Bacteria</li> </ul> <p>Classification of living organisms</p> <p><u>ECOLOGY</u></p> <p>Adaptations, interdependence and competition:</p> <ul style="list-style-type: none"> <li>• Communities</li> <li>• Abiotic factors</li> <li>• Biotic factors</li> <li>• Adaptations</li> </ul> <p>Organisation of an ecosystem:</p> <ul style="list-style-type: none"> <li>• Levels of organisation</li> <li>• How materials are cycled</li> </ul> <p>Biodiversity and the effect of human interaction on ecosystems:</p> <ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Waste management</li> <li>• Land Use</li> <li>• Deforestation</li> <li>• Global warming</li> <li>• Maintaining biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>• Fractional distillation and petrochemicals</li> <li>• Properties of hydrocarbons</li> <li>• Cracking and alkenes</li> </ul> <p><u>CHEMICAL ANALYSIS</u></p> <p>Purity, formulations and chromatography:</p> <ul style="list-style-type: none"> <li>• Pure substances</li> <li>• Formulations</li> <li>• Chromatography</li> </ul> <p>Identification of common gases:</p> <ul style="list-style-type: none"> <li>• Test for hydrogen</li> <li>• Test for oxygen</li> <li>• Test for carbon dioxide</li> <li>• Test for chlorine</li> </ul> <p><u>CHEMISTRY OF THE ATMOSPHERE</u></p> <p>The composition and evolution of the Earth's atmosphere:</p> <ul style="list-style-type: none"> <li>• The proportions of different gases in the atmosphere</li> <li>• The Earth's early atmosphere</li> <li>• How oxygen increased</li> <li>• How carbon dioxide decreased</li> </ul> <p>Carbon dioxide and methane as greenhouse gases:</p> <ul style="list-style-type: none"> <li>• Greenhouse gases</li> <li>• Human activities which contribute to an increase in greenhouse gases in the atmosphere</li> <li>• Global climate change</li> <li>• The carbon footprint and its reduction</li> </ul>	<ul style="list-style-type: none"> <li>• Properties of electromagnetic waves</li> <li>• Uses and applications of electromagnetic waves</li> </ul> <p><u>MAGNETISM AND ELECTROMAGNETISM</u></p> <p>Permanent and induced magnetism, magnetic forces and fields:</p> <ul style="list-style-type: none"> <li>• Poles of a magnet</li> <li>• Magnetic fields</li> </ul> <p>The Motor Effect:</p> <ul style="list-style-type: none"> <li>• Electromagnetism</li> <li>• Fleming's left-hand rule</li> <li>• Electric motors</li> </ul>
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	<p>Common atmospheric pollutants and their sources:</p> <ul style="list-style-type: none"><li>• Atmospheric pollutants from fuels</li><li>• Properties and effects of atmospheric pollutants</li></ul> <p>USING RESOURCES</p> <p>Using the Earth's resources and obtaining potable water:</p> <ul style="list-style-type: none"><li>• Using the Earth's resources and sustainable development</li><li>• Potable water</li><li>• Waste water treatment</li><li>• Alternative methods of extracting metals</li></ul> <p>Life cycle assessment and recycling:</p> <ul style="list-style-type: none"><li>• Life cycle assessment</li><li>• Ways of reducing the use of resources</li></ul>	
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