

Key Stage 4 Curriculum Journey: Combined Science Trilogy (2xGCSEs in Combined Science)

The curriculum in Science will spark curiosity and provide pupils with plenty of curricular and extra-curricular opportunities to undertake practical science. Pupils will work independently or collaboratively to gain problem solving skills and both scientific and ethical perspective. Our goal is for both budding and reticent scientists alike, to be aspirational learners who desire to have a sound understanding of scientific principles.

YEAR 10 CURRICULUM JOURNEY						
Topic	*Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
	<p>Communicable Disease</p> <p>Fundamental ideas in KS4 Chemistry</p> <p>Electricity-Mains & The National Grid</p>	<p>Health Issues & Communicable Disease</p> <p>Structure and Bonding</p> <p>Atomic Structure Part I- Development of the Model of the Atom</p>	<p>Cell Transport (Active Transport and Osmosis)</p> <p>Structure and Properties</p> <p>Atomic Structure Part 2 – Nuclear decay and half-life</p>	<p>Homeostasis Part I</p> <p>Quantitative Chemistry</p> <p>Forces Part I</p>	<p>Homeostasis Part 2 – Hormones in human reproduction</p> <p>Electrolysis</p> <p>Forces Part 2</p>	<p>Homeostasis Part 2 – Hormones in human reproduction continued</p> <p>Rates of Reaction</p> <p>Forces Part 3</p>
<p>Key Knowledge, Skills & Understanding</p> <p>*RP = Required Practical (HT) = higher tier content only</p>	<ul style="list-style-type: none"> Explain how pathogens make us ill. Describe the symptoms and treatments for bacterial, viral, fungal and protist diseases. Explain how the human body protects itself from pathogens. Explain how vaccinations provide immunity. Evaluate the process of drug development. Describe atoms using the nuclear model. Explain why the periodic table was a breakthrough in how to order the elements. Write word and balanced symbol equations for reactions. Use the particle model to explain how a chemical reaction occurs. Evaluate the uses of exothermic and endothermic reactions. RP: Investigate the variables that affect temperature changes in reacting solution. recall mains frequency and evaluate its safety. recall energy transfer equations. apply equations. explain why the National Grid system is an efficient way to transfer energy. 	<ul style="list-style-type: none"> Identify physical and mental health issues Explain how diseases interact Compare the effects of lifestyle on non-communicable disease Explain how cancer develops Analyse risk factors for disease Use equations to describe aerobic and anaerobic respiration Define and compare them Describe fermentation Describe and explain the effects of exercise on the body, ie. oxygen debt and recovery time. Describe States of Matter Theory Identify a covalent compound by its formula, name, or diagram Explain, in terms of electronic structure, how unfamiliar elements become ions and bond ionically. Explain how covalent and metallic bonds form Describe giant and simple molecular structures Recall mains frequency Use standard form to describe the size of atoms Explain the term isotope Describe how evidence led to the development of the atomic model Compare the plum pudding and nuclear atomic models 	<ul style="list-style-type: none"> Describe how substances move in and out of cells across cell membranes via diffusion. RP: Investigate how concentration affects the mass of plant tissue Explain how and why active transport is used by plant cells Compare and contrast three cell transport mechanisms. Explain how the structures of plant cells and tissues are related to function Describe the process of transpiration and translocation. Explain the properties of diamond and graphite in terms of bonding. Use a molecular model of a giant covalent structure to predict and explain its physical properties Recognise the structure of a fullerene or nanotube Evaluate models of bonding. Justify the advantages of alloys Know the properties of alpha, beta and gamma radiation Apply this to their practical use Write nuclear decay equations Define and determine half-life Compare hazards and precautions of using radioactive materials State the importance of peer review 	<ul style="list-style-type: none"> Compare and contrast different control systems. Explain how structure and adaptation of the nervous system Explain how the CNS coordinates a response (reflex arc) RP: Investigate the effect of a factor on reaction time. (RP) Describe hormonal co-ordination Identify the position of glands in the human body. Compare the response of the endocrine system with the nervous system. Explain control of blood glucose Evaluate diabetes treatment Calculate relative atomic and formula mass Explain why relative atomic masses may not be a whole number. Use the mole equation Explain why chemical equations must be balanced Calculate reacting masses and masses to balance equations Explain scalar and vector quantities Resolve forces using vector diagrams Explain why weight is a force Explain how work is done when a force moves an object RP: Investigate the relationship between force and extension 	<ul style="list-style-type: none"> Identify the hormones involved in human reproduction. Explain the roles of hormones in the menstrual cycle Evaluate different methods of contraception. Explain why issues around contraception cannot be answered by science alone. Describe the electrolysis of molten and aqueous compounds including use of word equations Construct half-equations RP: Investigate products of the electrolysis of aqueous solutions Compare and contrast the electrolysis of a compound in solution with molten compounds Recall typical values of speed Explain scalar and vector quantities Explain motion in a circle Determine speed from distance-time graphs Interpret enclosed areas in speed-time graphs to determine distance (HT) Interpret velocity-time graphs Interpret enclosed areas in velocity-time graphs to determine displacement (HT) Apply equation for uniform velocity 	<ul style="list-style-type: none"> Explain the process of IVF. Evaluate the use of IVF treatment. Explain social and ethical issues associated with IVF treatments. Explain the roles of thyroxine and adrenaline in the body. Interpret simple diagrams of negative feedback control. Safely describe a method to monitor rate of reaction. Calculate the rate of reaction Apply collision theory and describe surface area Describe the effect of temperature, concentration, pressure and catalysts RP: Measuring rates Describe reversible reactions Apply dynamic equilibrium Explain the effect of altering conditions of reactions at equilibrium Apply Newton's 1st Law to explain the motion of objects Recall and apply Newton's 2nd Law ($F=ma$) to explain motion RP: Investigate the effect of varying force on the acceleration of an object of constant mass Apply Newton's 3rd Law to examples of equilibrium situations

<p>GCSE Assessment Objectives-</p>	<p>Working scientifically (WS) - Students develop their working scientifically skills so that they can fully understand the scientific process. These skills fall broadly into four main strands and exams will include questions that assess all of these strands: 1. the development of scientific thinking 2. experimental skills and strategies 3. analysis and evaluation 4. vocabulary, units, symbols and nomenclature.</p> <p>Maths Skills (MS) – For Combined Science, a minimum of 20% of marks will test mathematical skills (made up of a minimum of 10% in biology; 20% in chemistry; and 30% in physics)</p> <p>Assessment Objectives (AO) - The exams will measure how students have achieved the following assessment objectives. AO1-Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures AO2-Apply knowledge and understanding of scientific ideas, scientific enquiry, techniques and procedures AO3-Analyse information and ideas to interpret, evaluate, make judgements, draw conclusions, develop and improve experimental procedures</p>					
<p>MAPs</p>	<p>MAP 1- Communicable Disease MAP 1- KS4 Chemistry: Fundamental Ideas (Energy Changes R.P.) MAP 1-Mains Electricity and Power</p>	<p>MAP 2- Health and Disease MAP 2- Bonding, structures & properties MAP 2-Development of the Atomic Model</p>	<p>MAP 3- Cell Transport MAP 3- Bonding, structures & properties (combined with MAP 2) MAP 3- Radioactivity</p>	<p>MAP 4- The Nervous System MAP 4- Quantitative Chemistry MAP 4- Forces and Elasticity (FT)</p>	<p>MAP 4- Hormones in human reproduction MAP 5- Electrolysis MAP 4-Forces and Elasticity (HT)</p>	<p>P2S3- Yr10 Mock Exam Paper I P2S3- Yr10 Mock Exam Paper I P2S3- Yr10 Mock Exam Paper I</p>

YEAR 11 CURRICULUM JOURNEY						
	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Topic	<p>Reproduction </p> <p>Organic Chemistry- Crude Oil and Fuels </p> <p>Forces part 3 continued </p>	<p>Variation and evolution </p> <p>Chemical Analysis </p> <p>Waves </p>	<p>Evidence for evolution </p> <p>The Earth's Atmosphere </p> <p>Waves continued </p>	<p>Ecology 1 </p> <p>The Earth's Resources </p> <p>Electromagnetism </p>	<p>Ecology 2 </p> <p>Revision </p> <p>Electromagnetism continued </p>	
Key Knowledge, Skills & Understanding *RP = Required Practical (HT) = higher tier content only	<ul style="list-style-type: none"> • Compare sexual and asexual reproduction. • Explain the process of meiosis. • Compare meiosis with mitosis. • Describe the structure of DNA. • Discuss the importance of understanding the human genome. • Draw genetic cross diagrams. • Predict the likelihood of inheriting genetic disorders. • Carry out genetic cross diagrams to show sex inheritance. • State what hydrocarbons are • Explain why fractional distillation is used to separate crude oil into fractions. • Describe how the properties of a fraction of crude oil make it appropriate for its use. • Write combustion equations for burning hydrocarbon fuels • Describe the cracking of hydrocarbons • Define stopping distance • Explain factors that affect stopping distance • Define momentum (HT) • Describe and explain examples of conservation of momentum (HT) 	<ul style="list-style-type: none"> • Collect class data to help explain environmental and inherited variation. • Explain how evolution occurs by natural selection. • Explain the impact of selective breeding of food plants and domesticated animals. • Evaluate the use of selective breeding. • Explain how genetic engineering can be used. • Interpret information to make informed judgements about issues concerning cloning and GM. • Compare pure substances, mixtures and formulations • Analysing chromatograms • RP: Chromatography • Describe gas tests (carbon dioxide, oxygen, hydrogen and chlorine) • Describe the differences between the properties of longitudinal and transverse waves • Describe methods to measure the speed of waves (RP) • Explain how different substances reflect, refract, absorb and transmit electromagnetic waves (HT) (RP) 	<ul style="list-style-type: none"> • Evaluate different theories of evolution. • Explain how fossils are formed and how they support the theory of evolution. • Discuss ways in which a species might become extinct. • Explain how bacteria may become resistant. • Describe the impact of developments in biology on classification systems. • Use evolutionary trees to show how organisms are related. • Describe the history of our Atmosphere • Explain how our atmosphere has evolved • Describe the effects of the main greenhouse gases • Suggest causes of global climate change • Explain the effects of atmospheric pollutants • Give examples of electromagnetic waves including their practical application and their associated hazards • Explain the above (HT) • Explain how different substances reflect, refract, absorb and transmit electromagnetic waves (HT) 	<ul style="list-style-type: none"> • Identify different communities • Identify factors that may affect the survival of organisms. • Describe and explain plant and animal adaptations. • Draw diagrams to show levels of organisation in ecosystems. • Population size of a common species in a habitat (RP) • Explain how to use sampling techniques. • Explain both the carbon and water cycle • Compare finite and renewable resources • Describe how water can be made safe to drink • RP: Water purification • Treating waste water • Extraction of metals from ores • Evaluate life cycle assessments of different products • Reduce, reuse, recycle • Differences between like and unlike poles of permanent and induced magnets • Describe how to plot a magnetic field pattern of a single wire and a solenoid using a compass • How a compass evidences the Earth's core as magnetic • Describe how the magnetic effect of current can be demonstrated and how it can be made stronger 	<ul style="list-style-type: none"> • Discuss ways in which waste can be managed in society. • Identify different ways land is used by humans. • Evaluate the environmental implications of deforestation. • Describe some of the biological consequences of global warming. • Describe both positive and negative human interactions in an ecosystem. • Discuss different ways in which biodiversity can be maintained. • Focus on exam practise and the skills required to answer questions at each of the assessment objectives • Apply Fleming's left-hand rule to show direction of force • Apply the $F=BIl$ equation when a current carrying conductor is at right angles to magnetic field • Explain how the force on a conductor in a magnetic field causes rotation in an electric motor. 	<p>Focus on exam practice and the skills required to answer questions at each of the assessment objectives</p>

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<p>MAPs</p>	<p>MAP 1- Reproduction MAP 1-Crude Oil & Fuels MAP 1-Newton’s Laws and stopping distance</p>	<p>MAP 1- Variation & Evolution MAP 2- Chemical Analysis MAP 2-The Properties of Waves</p> <p>P2S2- Yr11 Mock Exam Paper 1 P2S2- Yr11 Mock Exam Paper 1 P2S2- Yr11 Mock Exam Paper 1</p>	<p>MAP 1- Genetics and Evolution MAP 3 -The Earth’s Atmosphere MAP 3- Electromagnetic Waves</p>	<p>P2S3- Yr11 Mock Exam Paper 2 P2S3- Yr11 Mock Exam Paper 2 P2S3- Yr11 Mock Exam Paper 2</p>	<p>MAP 4- Ecology MAP 4 -The Earth’s Resources MAP 4-Magnetism & Electromagnetism</p>	