


Year 9: Combined Science	<p>Curriculum Intent: Year 9 science looks to build on the foundations from years 7 and 8 and work towards developing knowledge of similar areas as students begin to work towards their GCSE examinations:</p> <ul style="list-style-type: none"> • Physics: Energy, Motion, Waves and Radiation. • Chemistry: Particles, Periodic Table, Chemical Reactions and Earth and Environmental Science, with the addition of more complex ideas in Monitoring Reactions. • Biology: Cell Level Systems, Scaling up, Community Level Systems, Genes, Inheritance and Selection <p>The subject and procedural knowledge demands increase in this year, and students will be exposed to more complex ideas, models and explanations. Practical Activities (PAG) will be coupled with mathematical skills to build more procedural knowledge, focusing on areas such as data analysis and interpretation of graphs. The scientific knowledge developed through this year will provide the basis for further study in these areas as students enter year 10, with the whole of the Combined Science content being taught before the year 10 PPE's.</p>					
Key ideas and sequence of learning	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<p>Chemistry module C1 - particles</p> <ul style="list-style-type: none"> • Particles • Chemical & physical changes • Atomic structure • History of the development of the atom • Periodic table <p>Physics module P5 -- Energy</p> <ul style="list-style-type: none"> • Energy transfers <p>Physics module P1 -Matter</p> <ul style="list-style-type: none"> • Energy, heat & temperature • Specific heat capacity • State changes and specific latent heat 	<p>Physics module P1 -Matter</p> <ul style="list-style-type: none"> • Density • Gas pressure & temperature <p>Chemistry module C2 – elements & compounds</p> <ul style="list-style-type: none"> • Metals/non-metals • Electronic structure • Forming ions • Ionic compounds • Simple molecules • Giant covalent • Polymer • Structure of metals • Allotropes of carbon • Bulk properties 	<p>Physics module P2 - forces</p> <ul style="list-style-type: none"> • Speed • Vectors and scalars • Acceleration • Distance- time graph • Velocity – time graphs • Kinetic energy and motion calculations <p>Physics module 4-waves</p> <ul style="list-style-type: none"> • Wavelength and frequency • Wave properties • Wave speed <p>Biology module B2-Scaling up</p> <ul style="list-style-type: none"> • Cell differentiation • Stem cells • Exchange and transport • Circulatory system 	<p>Physics module 4-waves</p> <ul style="list-style-type: none"> • EM waves and EM spectrum • Isotopes • Alpha, beta and gamma radiation • Nuclear equations • Half life • Radiation in and out of atoms <p>Biology module B4-community level systems</p> <ul style="list-style-type: none"> • Ecosystems • Introduction to Sampling • Abiotic and Biotic Factors • Competition and Interdependence • Analysis of predator/prey graphs 	<p>Chemistry module 2</p> <ul style="list-style-type: none"> • Relative formula mass • Empirical formula • Filtration and crystallisation • Distillation • Chromatography <p>Chemistry module 4</p> <ul style="list-style-type: none"> • Group 1 • Group 7 • Group 0 • Reactivity of metals <p>Biology module 5 – Genes, inheritance and selection</p> <ul style="list-style-type: none"> • Meiosis • Dominant and recessive alleles • Genetic crosses • Mutations • Natural selection 	<p>End of Year exams and review</p> <p>Physics module- P3 electricity</p> <ul style="list-style-type: none"> • Introduction to circuits and basic circuit rules <p>Disciplinary knowledge</p> <ul style="list-style-type: none"> • Disciplinary terminology • Graph skills • Maths skills for science • Osmosis investigation analysis to apply skills

	<p>Biology module B1 - cell level systems</p> <ul style="list-style-type: none"> • Maths skills for science • Plant and animal cells • Bacterial Cells • Light Microscopes • Electron Microscopy • DNA Structure • Enzymes & enzyme reactions • Biological Molecules • Aerobic respiration 	<ul style="list-style-type: none"> • Changing state <p>Biology module B1</p> <ul style="list-style-type: none"> • Anaerobic respiration • Photosynthesis • Factors affecting photosynthesis • Limiting factors of photosynthesis <p>Biology module B2- scaling up</p> <ul style="list-style-type: none"> • Diffusion • Osmosis • Active transport • Mitosis 	<ul style="list-style-type: none"> • Heart and blood • Plant transport systems. • Transpiration stream • Factors affecting transpiration 	<ul style="list-style-type: none"> • Nutrient cycling • Carbon cycle <p>Biology module 5 – Genese, inheritance and selection</p> <ul style="list-style-type: none"> • Variation • Sexual and asexual reproduction 	<ul style="list-style-type: none"> • Evidence of evolution • Classification systems <p>Revision for end of year exams</p>	
<p>Key Questions</p>	<ol style="list-style-type: none"> 1. How are particles arranged in solids, liquids and gases? 2. What in inside the atoms? 3. How did we discover the atom? 4. What are the energy stores and how is energy transferred? 5. What happens when we heat solids, liquid and gases? 	<ol style="list-style-type: none"> 1. How do gases exert pressure? 2. How are chemical bonds formed? 3. What are the allotropes of carbon? 4. What is the structure of metals and plastics? 5. What is the difference between aerobic and anaerobic respiration? 	<ol style="list-style-type: none"> 1. How do we calculate and measure speed? 2. How do we represent motion graphically? 3. What are the properties of waves? 4. How do cells differentiate? 5. How does body cells multiply? 6. What is the importance of stem cells? 7. How does the body transport oxygen? 8. How do plants transport water and 	<ol style="list-style-type: none"> 1. What is the EM spectrum and how does it affect our lives? 2. What is ionising radiation and how do we measure it? 3. How do ecosystems interact? 4. How are nutrients recycled through the environment? 5. How does human reproduction 	<ol style="list-style-type: none"> 1. How do we separate chemical compounds? 2. How can we determine masses of reactants? 3. How can we purify and analyse chemicals? 4. How can we predict trends in the periodic table? 5. How are our characteristics inherited? 6. What evidence is there for evolution 	<ol style="list-style-type: none"> 1. What rules apply to circuits 2. What is the correct terminology to use in science practical work 3. How do we use Maths skills in science

	6. What is inside a cell? 7. What happens inside a cell 8. How do we digest food? 9. How do cells release energy?	6. How do plants produce and store food? 7. Which factors have an impact on the rate of photosynthesis? 8. Which processes help to transport substances across membranes?	what factors affect it?	produce variation?	7. How do we organise the natural world?	
Vocabulary	Chemistry <ul style="list-style-type: none"> • Solid • Liquid • Gas • Melting Point • Boiling Point • Ion • Isotope Physics Module <ul style="list-style-type: none"> • Thermal • Gravitational • Chemical • Magnetic • Kinetic • Nuclear • Electrostatic • Forces • Waves • Heating • Current 	Physics <ul style="list-style-type: none"> • Density • Pressure Chemistry <ul style="list-style-type: none"> • Relative Formula Mass • Group • Period • Ionic Compound • Covalent Compound • Dot And Cross Diagram • Giant Lattice • Allotrope • Polymer • Metals • Lattice 	Physics <ul style="list-style-type: none"> • Velocity • Acceleration • Deceleration • Distance • Displacement • Time • m/s • km/s • Equation • m/s² • Distance-time graph • Transverse • longitudinal • Wavelength • Frequency Biology <ul style="list-style-type: none"> • Specialised • Acrosome • Biconcave 	Physics <ul style="list-style-type: none"> • Electromagnetic • Radio • Microwave • Infrared • Visible • Ultraviolet • X-Ray • Gamma • Alpha • Beta • Half life • Ionisation • Penetration • Attraction • Repulsion • Unstable isotope Biology <ul style="list-style-type: none"> • Abiotic Factors • Biomass 	Chemistry <ul style="list-style-type: none"> • Rf value • filtration • Fractional Distillation • Reactivity • Trends • Outer electron • Displacement reaction Biology <ul style="list-style-type: none"> • Alleles • Asexual reproduction • Cancer • Clone • Continuous variation • Diploid cells • Discontinuous Variation 	Physics <ul style="list-style-type: none"> • Circuit • Current • Potential difference • Voltage • Ammeter • Voltmeter • Resistance Disciplinary knowledge <ul style="list-style-type: none"> • Precision • Accuracy • Variables • Valid • Reproducible • Repeatable

	<ul style="list-style-type: none"> • Specific Heat Capacity • Specific Latent Heat <p>Biology</p> <ul style="list-style-type: none"> • Cell membrane • Cell wall • Chloroplast • Cytoplasm • Eukaryotic cell • Flagellum • Mitochondria • Nucleus • Plasmid • Prokaryotic cell • Resolution • Magnification • Electron microscope • Vacuole • Active site • Bases • Chromosome • Complementary Base pairing • Denature • DNA • DNA base • Polymer • Monomer • Enzyme • Active site • Gene • Metabolic rate • Aerobic Respiration 	<ul style="list-style-type: none"> • Giant Covalent <p>Biology</p> <ul style="list-style-type: none"> • Anaerobic Respiration • Metabolic rate • Oxygen debt • ATP • Exothermic • Fermentation • Chlorophyll • Endothermic • Limiting Factors • Photosynthesis • Light intensity • Active Transport • Concentration gradient • Diffusion • Osmosis • Concentration gradient • Water potential • Turgid • Plasmolysis • Flaccid • Lysis • Crenated • Cell • Cyle • DNA replication • Mitosis • Chromosomes • 	<ul style="list-style-type: none"> • Haemoglobin • Ciliated • Palisade cell • Platelets • Meristem • Differentiation • Meristems • Mitosis • Alveoli • Artery • Atria • Capillary • Diffusion distance • Double Circulatory System • Exchange Surface • Heart • Lumen • Xylem • Phloem • Translocation • Vascular Bundle • Potometer • Vein • Ventricle • Transpiration 	<ul style="list-style-type: none"> • Biotic Factors • Carbon Cycle • Community • Competition • Consumers • Decomposers • Detritivores • Ecosystem • Egestion • Excretion • Habitat • Interdependence • Mutualism • Parasitism • Population • Predation • Producers • Discontinuous Variation • Dominant allele • Environmental Variation • Fertilisation • Gametes • Sex Cells 	<ul style="list-style-type: none"> • Dominant allele • Environmental Variation • Fertilisation • Gametes • Sex Cells • Genetic cross • Genetic variation • Genome • Genotype • Haploid Cells • Heterozygous • Homozygous • Meiosis • Mutation • Phenotype • Punnett square • Recessive allele • Sexual reproduction • Variation • Zygote • Alleles • Asexual reproduction • Cancer • Clone • Continuous variation • Diploid cells • Discontinuous variation 	
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<p>Practical Skills</p>	<p>Chemistry</p> <ul style="list-style-type: none"> • Comparing chemical and physical changes • Specific heat capacity <p>Biology</p> <ul style="list-style-type: none"> • Light Microscopy • Investigating Enzyme activity • Food Tests 	<p>Physics</p> <ul style="list-style-type: none"> • Density <p>Biology</p> <ul style="list-style-type: none"> • Testing for Starch in plants • Investigate factors affecting photosynthesis • Investigate osmosis 	<p>Physics</p> <ul style="list-style-type: none"> • Speed • acceleration <p>Biology</p> <ul style="list-style-type: none"> • Heart dissection • Transpiration 	<p>Physics</p> <ul style="list-style-type: none"> • radiation demonstration • skittles experiment <p>Biology</p> <ul style="list-style-type: none"> • Sampling techniques • Decomposition • Asexual reproduction in plants 	<p>Chemistry</p> <ul style="list-style-type: none"> • Filtration and crystallisation • Chromatography • 	<p>Physics</p> <ul style="list-style-type: none"> • Building simple circuits using Phet demos <p>Biology</p> <ul style="list-style-type: none"> • osmosis