Whalley Range High School – Curriculum Map –Science and Discovery Faculty

		Term 1		Term 2		Term 3	
	Number of weeks	8		7		6	
Year 7	*Topic Title and NC link*	Chemical Reactions The Particulate Nature of Matter	Forces and Motion Race to the line/ CREST Space Physics	Structure and function of living organisms Reproduction	Pure and Impure Substances The Periodic Table	Sound Waves	Interactions and Interdependencies
	Pupils should know… (Core knowledge and concepts to learned)	Students in year 7 science will start the year studying the BIG IDEA: CHEMICAL REACTIONS (CH3) and BIG IDEA: PARTICLES AND STRUCTURE (CH2). This will cover the following key concepts. • Chemical and physical changes • Acids, alkalis and the pH scale • Neutralisation and uses • Combustion • Particle model • Changes of state • Pure substances and mixtures Students will take part in practical that will develop new lab skills, with a focus on safety.	In half term 2 the year 7 students will focus on Forces and Electricity to support their understanding of BIG IDEA: FORCES AND MOTION (PH2) and BIG IDEA: EARTH IN SPACE (PH5). This will cover the following key concepts. • What forces do • Describing forces • Balanced and unbalanced forces • Friction • Planets and the solar system • Gravity • The night sky, stars and galaxies • Days and seasons The students will also be taking part in the national CREST award through the Race to the Line Project.	In half term 3 the students at WRHS will move onto the first biology units to support their understanding of BIG IDEA1: THE CELLULAR BASIS OF LIFE (BI1) and BIG IDEA 2: HEREDITY AND LIFE CYCLES (BI2). Organisms are made of one or more cells, which need a supply of energy and molecules to carry out life processes. This will cover the following key concepts • Reproduction in plants • Male reproductive system • Female reproductive system • Plant and animal cells • Unicellular organisms • Introduce concept of diffusion	During this half term students will be introduced to the BIG IDEA: PARTICLES AND STRUCTURE (CH2) This will cover the following key concepts: • Key concepts: Atoms (Dalton model) and molecules • Symbols and formulae • Compounds and mixtures (to recap) • The periodic table • Identification of pure substances and mixtures • Solubility • Comparison of metals and materials • Solutions • Separating solutions • Diffusion	The year 7 scientists will build on their basic understanding of physics to understand the BIG IDEA: SOUND, LIGHT AND WAVES (PH3). Waves radiate information and students will develop understanding of how waves help us to communicate. This will cover the key concepts as follows: • Frequencies of sound waves • Sounds needs a medium to travel • Sound produced by the vibration of objects (including the mechanism in the ear) • Sound waves are longitudinal • Waves on water travel with transverse motion • Auditory range of humans and animals • Echoes, reflection and absorption of sound Students will take part in a sound workshop.	Students will prepare for the end of year exams followed by the last unit of the year that supports their understanding of BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) and BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4). • Food chains and food webs • Habitats • Interdependence (simple definitions) • Competition This will be aided by visiting Lytham Beach to understand the ecosystems at the beach and will undertake a summer project.
	Pupils should be able to do… (Skills being developed…	Risk assessments/ Classifying substances based on evidence Id lab equipment / Describe a practical using correct lab equip. Reading scales/ Units of measurement Making an indicator/Boiling water	Creating a hypothesis / Keeping scientific records Writing conclusion/ Writing like a scientist Reading scales of Newton meters/ Analysing data of planets Friction/ Lunar diary	Identifying patterns in data/ scientific drawing Id anatomy of different organisms / Id parts of a light microscope Identifying points on a graph/ understand scale Speed Dispersal/ Using a light microscope	Following methods safely and identifying risks/ Identifying patterns from data Writing methods/ Using keys (the periodic table) Reading scales of graphs/ Use scales to identify Mp and Bp Chromatography/ Metals and non-metals circus	Interpreting oscilloscope traces Making scientific sentences to explain concepts Calculation of speed of sound (N)String telephone or ruler practical	Reading food webs and food chains Using keys to identify different species Predicting population numbers under different scenarios Beach Combing on Ecology Trip
	Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	Students gain the fundamentals of working safely in a lab and use their KS2 knowledge to build on scientific techniques (Start of CH1 Big idea in science). Pupils will not have been taught chemistry since Year 5 so this is the building blocks for all science knowledge.	Starting fundamentals of physics with forces. To be developed further in Year 8 and 9. Students will develop their understanding of space from KS2 to include how satellites work and why they are important. This will be aided by the trip to Jodrell Bank to see a working telescope.	Students build on their KS2 knowledge of organisms and organ systems to understand the key components the cellular basis of life. This has been reorganised to start with systems and work to cells to match the KS2 POS.	Students will build on the practical skills in half term 1 and learn how chemical reactions occur and why. This is essential for any future chemistry knowledge. This will also cover the fundamentals of all particles and materials.	This unit is being taught in year 7 to bring together the importance and relevance of science in student's daily lives. It will also be giving students a basic understanding of sound and waves to be built on in year 8 in the light topic.	Students will prepare for the end of year exams followed by the last unit of the year ecosystems which will develop ideas about food chains from KS2 by incorporating the movement of energy

	Topic Title and NC link	Interactions and Interdependencies Genetics and Evolution	Forces and Pressure Forces and Energy	Earth and Atmosphere Materials	Electricity and Electromagnetisms	Systems	Light Waves and Jodrell Bank and Energy changes and transfers
Year 8	*Pupils should know… (Core knowledge and concepts to learned)*	Students will start to explore different organisms and how adaptations are passed on by linking their ideas to the Big Idea HEREDITY AND LIFE CYCLES (BI2). These units will cover the following key concepts. • Interdependence within ecosystems revisited with a focus on bioaccumulation and human food security • Photosynthesis • DNA as a simple model of chromosomes, genes and DNA in hereditary • Variation driving natural selection • Changing environments leading to extinction and the importance of preserving hereditary material Students will take part in a project to create their own organism that has become extinct to deepen their knowledge and support recall.	In half term 2 the year 8 students will focus on Forces building on their ideas form HT2 in year 7. They will study BIG IDEA: FORCES AND MOTION (PH2) This will cover the following key concepts. • Pressure and surface area • Gas pressure and atmospheric pressure • Pressure in fluid • Floating and sinking • Force-extension linear relation; Hooke's Law as a special case • Work done and energy changes on deformation • Moment as the turning effect of a force • Moments to explain that simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged	In half term 3 students will seek to understand the make-up of the planet through the BIG IDEA: EARTH'S ATMOSPHERE (CH4) and SUBSTANCES AND PROPERTIES (CH1). This will cover the following key concepts. • Composition and structure of the Earth • Rock cycle and formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • Properties of ceramics, polymers and composites (qualitative) • Metal extraction (use of carbon in obtaining metals from metal oxides) • Recycling • Carbon cycle • Composition of the atmosphere • Production of carbon dioxide by human activity and the impact on the climate	The year 8 scientists will build on their basic understanding of physics using the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4). This will build on light from HT2 and circuits that they have investigated at KS2. This will cover the following key concepts. • Making circuits • Electric current • Voltage • Static electricity • Resistance, • Series and parallel circuits • Magnetic poles, fields • electromagnets	In half term 5 students will build on their ideas of cells from HT1 of year 7 and Cells and Photosynthesis from HT1 in year 8 with their KS2 knowledge of the circulatory system using the BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1) • Systems in plants and animals (circulatory, skeletal, muscular, respiratory and digestive systems) • Introduce simple definition of diffusion • Recreational drugs and the effect on behaviour, health and life processes (including the effect of maternal lifestyle on the foetus through the placenta). • Exercise and the effect on the body's systems.	In half term 6 the students in year 8 will study light and its use in communications and then visit a working telescope at Jodrell Bank in Cheshire. This will explore B BIG IDEA: SOUND, LIGHT AND WAVES (PH3) - Waves radiate information. Understanding waves helps us to communicate • Similarities between light and waves in matter • Transmission of light through materials; absorption, diffuse scattering • Use of ray model to explain images, refraction, pinhole camera, refraction of light • Comparing the starting and final condition of a system in terms of energy • Comparing amounts of energy transferred to understand domestic fuel bills, use and costs Students will produce a cross curricular project with English to present light projects in science and poetry in English. This culminates in a competition.
	Pupils should be able to do… (Skills being developed…	Reading food chains and webs/ understanding scientific processes that underpin theories.. Researching different ecosystems/ describing a process Predicting pop. Numbers using different scenarios/ drawing graphs Testing leaf for starch/ Extracting DNA	Identifying CVs/ Identifying IV, DV Writing conclusions/ describing graphs Pressure Eqn/ Moments Eqn. Floating and sinking boat/ Calculating moments	Recording data/ Constructing table Id rocks using vocab/ Describing properties of materials Reading graphs/ Analysing tables Erosion/ Plastic bag properties	Drawing Circuit Diagrams Keys word to explain circuits Manipulation of VIR equation Series and Parallel Circuits	Independently research diseases linked to each system. Describing systems anatomy using KW Calculate percentages. Forces exerted by different muscles	Write up a full practical investigation. Light oracy presentation Measuring angles/ calculating energy transferred quantitatively Drawing ray diagrams/ Thermal conductivity
	Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	This unit will build KS2 topics of pollination and seed dispersal and touch upon photosynthesis. This will link to the work on food chains in HT6 (Yr 7) as well as preparing them for year 9. KS2 knowledge on variation, DNA and Evolution will be built upon at this stage as well as recapping KS3 (organisms at a cellular level). This will prepare students for GCSE.	This unit will build on KS3 forces so that pupils can apply their knowledge to everyday contexts. This unit will provide the foundations for their work at GCSE when they will have to apply multi-step calculations and analyse more complicated data to the contexts.	Looking at the rocks that build up our planet ready for more extensive learning in KS4 about how this has caused the atmosphere to develop	This unit is being taught in year 8 to bring together the importance and relevance of science in student's daily lives. It will also give students basic understanding of electrical components and how current moves. This will build on their KS2 knowledge of basic circuit and prepare them for more complex circuits in year 10.	Students will have knowledge of systems from KS2. This is developed at KS3 to look at how organisms arrange their systems and the impacts that drugs may have on humans. This broad appreciation of systems will aid their understanding in KS4 when they go into more detail about the processes occurring in these systems.	Students will have experienced light at KS2. In the year 8 unit, students will develop their knowledge of light to different scenarios. Students will develop an understanding of what energy is through every day, practical examples. They will develop quantitative analysis of how energy changes in a system and this will support them in this topic at KS4.

Year 9	*Topic Title and NC link*	Cell Structure Organisation	Atomic Structure & Periodic Table Bonding	Particle Model of Matter Atomic Structure/radioactivity	Infection & Response: Health issues and Cancer Respiration	Energetics Reactivity of Metals Reactions of Acids	Revision for the end of year exam Forces and motion
	Pupils should know… (Core knowledge and concepts to learned)	The students will be covering BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1) and a small section of BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (B14) to revisit and deepen their knowledge. KS4 key concepts: • Animal, plant and bacterial cells • Bodily system • Heart and Circulatory systems • Role of diffusion in the movement of substances that is driven by differences in concentration • Non-communicable diseases.	Half term 2 will continue to build on the fundamentals in chemistry from year 7 and 8. These units will cover BIG IDEA: PARTICLES AND STRUCTURE (CH2): All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials • Representing reactions • Varying physical and chemical properties of different elements • Types of bonding • Structure linked to properties of compounds • Understanding chemical reactions as the rearrangement of atoms Year 9 will also experience a big bang show, where the University present this topic in a real-world context.	In half term 3 students will start to explore the links between chemistry and physics. These units will cover BIG IDEA: MATTER (PH1) • Density • Radioactive decay • Half lives • Particle model of the atom (simple Dalton model)	The students in year 9 will cover BIG IDEA 5: HEALTH AND DISEASE (BI5) in half term 4 with a small section of BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENT (BI3) to revisit to deepen their knowledge. • Pathogens • Preventing infection – animals • Preventing infection – plants • Respiration As part of science week all year 9 will take part in the biology Olympiad to widen the context of the science they a learning in class. Students will model a disease outbreak ‘purpleitous’ across the school. This be incorporated in their maths lesson to support the analysis of the spread of data.	This unit will cover BIG IDEA: CHEMICAL REACTIONS (CH3) During a chemical reaction, atoms are rearranged forming new substances. • Exothermic and endothermic reactions • Measuring Concentration using the pH scale • Neutralisation • Making salts • Reactivity series • Patterns in chemical properties of the elements	This unit will cover BIG IDEA: FORCES AND MOTION (PH2) building on from the forces topic in year 7 and 8. • Describing speed • Representation of a journey on distance-time graphs • Relative Motion graphs • Changing motion • Drag Mass and weight • Resultant force
	Pupils should be able to do… (Skills being developed…	Observations/carrying out methods Writing methods M I A and unit conversions Microscopes, Food Test, Enzymes	Analysis of graphs Compare 3 types of bonding Electronic structure, Sig Fig Cooling Curves	Processing data Timeline of particle model Manipulating Equation, Std Form Density , SHC (simple)	Application to a range of contexts Development of drugs Statistical tests, Averages, Range Anaerobic respiration in yeast	Collection of data/ Evaluate risk Creating methods Balancing symbol equation Soluble salts and Energy Changes	Improving experimental design Describing D/T and V/T journey Shape areas, graphs, estimates Acceleration
	Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	This unit develops ideas from year HT3 of year 7 and HT5 of year 8 and the function and parts of the circulatory system from KS2.	This develops ideas from year 7 and 8 for year 9 and will allow students to link structure of compounds to the properties	This half term will focus on developing ideas in physics from year 7 and 8. This unit will allow students to link the particle model to radioactive decay and why this is a useful source of energy	In half term 4 students will introduce respiration and will develop greater understanding of the chemical processes in organisms. They will also build on cell structure from HT1 and discuss 4 pathogens and the effect on the body.	In half term 5 the students will be applying their understanding of chemical reactions and combining this with new knowledge which will explain how energy changes in reactions. Building on BIG IDEA: CHEMICAL REACTIONS (CH3)	The end of year exam will bring together the work in biology, chemistry and physics in one paper whilst assessing practical skills in another. This will allow students to gain clear areas of strength and areas for improvement

Year 10 Combined Science

Topic Title and NC link	4.4.1 Photosynthesis 4.2.3 Plants and Organ systems 4.1.2Cell Division 4.1.3 Transport 6.5 Rates of Reaction and Equilibria	6.1 Energy 5.6 Equilibria 5.2.2 Structure and properties 5.4.3 Electrolysis 4.1.2Cell Division 4.1.3 Transport	6.2 Electricity 5.2.2 Structure and properties 5.4.3 Electrolysis 6.1 Energy 5.7 Organic Chemistry 5.9 Chemistry of the Atmosphere	4.5 Homeostasis 5.7 Organic Chemistry 5.9 Chemistry of the Atmosphere 6.2 Electricity 4.5 Homeostasis	6.5 Force 1 5.3 Quantitative Chemistry 4.5 Homeostasis	4.7 Ecology Part 1 HT6 Required Practical Review
Core Knowledge/ Concepts *Pupils should know… (Core knowledge and concepts to learned)*	GCSE AQA Combined Trilogy Spec **Biology** • Photosynthesis, transpiration, structure of plant, potometer. • Cell division, diffusion, osmosis, active transport and SA: Vol. **Chemistry** • Effect of concentrations, temperature, catalysts and surface areas effect rates. • Reversible reaction and dynamic equilibrium.	GCSE AQA Combined Trilogy Spec **Biology** • Cell division, diffusion, osmosis, active transport and SA: Vol. **Chemistry** • Reversible reaction and dynamic equilibrium. • Structure and properties of ionic, covalent and metallic structures. • Electrolysis **Physics** • Energy stores, transfers, work done, power, SHC. • Energy resources and efficiency	GCSE AQA Combined Trilogy spec **Chemistry** • Structure and properties of ionic, covalent and metallic structures. • Electrolysis • Fractional distillation • Development of the atmosphere, combustion, carbon foot print. **Physics** • Energy stores, transfers, work done, power, SHC. • Energy resources and efficiency. • Circuits, V I R in series and parallel, Ohms law, IV characteristics, plugs, power, components. • Energy transfers and the national grid.	GCSE AQA Combined Trilogy Spec **Biology** • Nervous system, hormonal controls of glucose, puberty, negative feedback. • Contraception, IVF. **Chemistry** • Fractional distillation, alkanes, cracking • Development of the atmosphere, combustion, carbon foot print. **Physics** • Circuits, V I R in series and parallel, Ohms law, IV characteristics, plugs, power, components. • Energy transfers and the national grid.	GCSE AQA Combined Trilogy Spec **Chemistry** • Mr, conservation of mass, mole, limiting reactants, concentration of solutions. • Avogadro's constant **Physics** • Scalar and vectors qualities, mass, weight and gravity, vector diagrams, resolving forces, work done • Hooke's Law and elastic potential energy.	GCSE AQA Combined Trilogy Spec **Biology** • Communities, interdependence, abiotic and biotic factors. • Adaptations, sampling, food chains and food webs. **RQP Review** • Photosynthesis, osmosis, reaction time, food tests, enzymes, microscopes • Rates, electrolysis, soluble salts, energy changes, • SHC, resistance, IV characteristics, Hooke's law, acceleration, density • Example of the above in different situations and exam question practice questions.
Pupils should be able to do… (Skills being developed…	Application to other contexts, hypothesis and conclusion. Describing methods Calculation of rate, gradient, graph drawing, percentage change. Rate of Reaction, Photosynthesis and Osmosis.	Constructing tables, interpret results and evaluate risk. WTM of command words Uncertainty, calc of SA:Vol ratio. SHC, Electrolysis.	Describe procedure, tangents, identify equipment, evaluation. Extended response Recall and manipulation 21 equations, unit conversion. Electrolysis, SHC, resistance, IV characteristics.	Unit conversion, evaluate experimental method, tables. RQP terminology practice Scatter graph interpretation, plotting graphs. Reaction Time, resistance, IV Characteristics.	Identify patterns in data, state relationships between variables. 4 mark questions with MS Quantitative chemistry, Vectors, tangents, angles and equations. Hooke's Law.	Planning, interpret data, numeracy. 6-mark questions with MS Sample size calculations. Field investigations.
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	**5.6** building on BIG IDEA: CHEMICAL REACTIONS (CH3) **4.4** Building on photosynthesis in year 8 and as well as **4.1.2/4.2.3** building on THE CELLULAR BASIS OF LIFE (BI1)	**6.1** Building on the BIG IDEA: MATTER (PH1) **5.2 and 5.4** building on the big ideas of BIG IDEA: PARTICLES AND STRUCTURE (CH2) and BIG IDEA: SUBSTANCES AND PROPERTIES (CH1)	**6.1** Building on the BIG IDEA: MATTER (PH1) **6.2** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4) **5.7 and 5.9** building on the big idea BIG IDEA: EARTH'S ATMOSPHERE (CH4)	**4.5** building on the big idea THE CELLULAR BASIS OF LIFE (BI1) **5.7 and 5.9** building on the big idea BIG IDEA: EARTH'S ATMOSPHERE (CH4) **6.2** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4).	**6.5** Building on the BIG IDEA: FORCES AND MOTION (PH2) from year 8 and year 9. **5.3** building on BIG IDEA: PARTICLES AND STRUCTURE (CH2) and BIG IDEA: CHEMICAL REACTIONS (CH3).	**4.7** Building on the BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) from across the key stages. Required practical review ensuring consolidation of RQP skills and WS skills developed through out the year.

Year 11 Combined Science

Topic Title and NC link	4.7 Ecology 5.8 Chemical Analysis 5.10 Using resources	4.6 Inheritance and Variation 5.10 Using resources 6.7 Magnetism 6.6 Waves	6.5 Forces 6.6 Waves 4.6 Inheritance and Variation	4.5 Homeostasis 5.7 Organic Chemistry 5.9 Chemistry of the Atmosphere 6.2 Electricity	Revision paper 1 Quant chemistry External Exams	External Exams
Core Knowledge/ Concepts *Pupils should know… (Core knowledge and concepts to learned)*	GCSE AQA Combined Trilogy Spec **Biology** • Water and carbon cycle • Effect of human population on the environment, • Global warming and maintaining biodiversity. **Chemistry** • Purity, formulations, chromatography, gas tests • Finite, renewable resources, waste water, copper extractions, LCA, reduce, reuse and recycle.	GCSE AQA Combined Trilogy Spec **Biology** • Reproduction, meiosis, DNA, genetics • Evolution, variation, natural selection, • Genetic engineering, selective breeding, fossils, extinction, classification. **Chemistry** • Finite, renewable resources, waste water, copper extractions, LCA, reduce, reuse and recycle. **Physics** • Waves in fluids and solids, ripple tank, refection, transverse and longitudinal waves • EM spectrum and uses and applications of EM waves.	GCSE AQA Combined Trilogy Spec **Biology** • Reproduction, meiosis, DNA, genetics • Evolution, variation, natural selection, • Genetic engineering, selective breeding, fossils, extinction. **Physics** • Waves in fluids and solids, ripple tank, refection, transverse and longitudinal waves • EM spectrum and uses and applications of EM waves. • Magnets, electromagnets, motors, F BIL.	GCSE AQA Combined Trilogy Spec **Biology** • Nervous system, hormonal controls of glucose, puberty, negative feedback. • Contraception, IVF. **Chemistry** • Fractional distillation, alkanes, cracking • Development of the atmosphere, combustion, carbon foot print. **Physics** • Circuits, V I R in series and parallel, Ohms law, IV characteristics, plugs, power, components. • Energy transfers and the national grid.		
Pupils should be able to do… (Skills being developed…	Accurate measurements, hypothesis and conclusion. Describe the procedure Sample size, translate between graph and table, Rf values. Chromatography, Water purification, Field investigations	Methods, evaluating and improving methods, id patterns. Extended response evolution. Probability punnet squares, frequency, bar chart, histogram. Water purification, Waves, Radiation and absorption	State relationships between variables, evaluate conclusion WTM Command words Angles, Recall and manipulation 21 equations. Waves, Radiation and absorption.			
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	**4.7** Building on the BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) from across the key stages and recap from HT6 of last year. **5.8 and 5.10** summaries and apply multiple topics from across KS3 and KS4 focus on building on all chemistry key principles CH1 – CH4.	**4.6** Building on BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) from year 7/8. **5.10** summaries and apply multiple topics from across KS3 and KS4 focus on building on all chemistry key principles CH1 – CH4 **6.6** building on BIG IDEA: SOUND, LIGHT AND WAVES (PH3) from KS3 curriculum.	**6.6** building on BIG IDEA: SOUND, LIGHT AND WAVES (PH3) from KS3 curriculum. **6.7** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4) form KS3. **4.6** Building on BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) from year 7/8.			

Year 10 Separate	*Topic Title and NC link* Biology Chemistry Physics	4.1.2 Cell Division 4.1.3 Cell Transport 4.1.1 Culturing Organisms	4.3.2 Monoclonal Antibodies 4.4.1 Photosynthesis	4.2.3 Plants and Organ systems. 4.3.3 Plant Disease.	4.5 Homeostasis	4.5.4 Plant Hormones	4.7 Ecology
		5.2.2 Structure and properties 5.1.3 Properties of transition metals 5.2.4 Nanoparticles	5.3 Quantitative chemistry	5.4.2.5 Titrations 5.4.3 Electrolysis	5.5.2 Chemical cells and Fuel cells 5.6 Rates of Reaction and Equilibria	5.7 Organic Chemistry	5.7 Organic Chemistry
		6.1 Energy	6.1 Energy	6.2 Electricity	6.2 Electricity 6.3.3.2 Pressure in gases	6.4.3 Hazards of radiation 6.4.4 Nuclear Fission and fusion	6.6 Waves
	Core Knowledge/ Concepts *Pupils should know… (Core knowledge and concepts to learned).* *Italic – separate science only content.*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Cell division, diffusion, osmosis, active transport and SA:Vol. • *Recall and separate only content of infection and response* • *Culturing microorganisms and binary fission.* **Chemistry** • Structure and properties of ionic, covalent and metallic structures. • *Nanoparticles* • *Properties of transition metals* **Physics** • Energy stores, transfers, work done, power, SHC. • Energy resources and efficiency.	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • *Detection, identification and response to plant diseases* • *Production and use of monoclonal antibodies.* . **Chemistry** • Mr, conservation of mass, mole, limiting reactants, concentration of solutions. • Avogadro's constant • *Percentage yield, atom economy, using concentrations and gases.* **Physics** • Circuits, V I R in series and parallel, Ohms law, IV characteristics, plugs, power, components. • Energy transfers and the national grid. • *Thermal conductivity*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Photosynthesis, transpiration, structure of plant, potometer. **Chemistry** • Electrolysis. • *Titrations of strong acid and alkali* **Physics** • Circuits, V I R in series and parallel, Ohms law, IV characteristics, plugs, power, components. • Energy transfers and the national grid. • *Static electricity and electrical fields.*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Nervous system, hormonal controls of glucose, puberty, negative feedback. • *Brain, eye, body temperature, kidneys, water and urea* **Chemistry** • *Chemical cells, batteries and fuel cell.* • Effect of concentrations, temperature, catalysts and surface areas effect rates. • Reversible reaction and dynamic equilibrium. **Physics** • Energy transfers and the national grid. • *Static electricity and electrical fields.* • *Pressure in gases and increasing pressure in gases*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Menstrual cycle • Contraception, IVF • *Coordination and control, use of plant hormones.* **Chemistry** • Fractional distillation, alkanes and cracking and alkenes, • *Reaction of alkenes and alcohols, carboxylic acids, synthetic and natural occurring polymers. DNA, condensation reactions.* **Physics** • *Background radiation, uses of nuclear radiation, half-lives of radioactive isotopes nuclear fission and fusion.*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Communities, interdependence, abiotic and biotic factors. • Adaptations, sampling, food chains and food webs. • *Trophic levels and biomass* **Chemistry** • *Reaction of alkenes and alcohols, carboxylic acids, synthetic and natural occurring polymers. DNA, condensation reactions* **Physics** • Waves in fluids and solids, ripple tank, refection, transverse and longitudinal waves • EM spectrum and uses and applications of EM waves. • *Waves for detection and exploration, lenses, black body radiation.*
	Pupils should be able to do… (Skills being developed…	Application to other contexts, hypothesis and conclusion. Describing methods SA:Vol ratio, gradient, graph drawing, Recall and manipulation 21 equations, Osmosis, *Culturing microorganisms*. SHC.	Constructing tables, interpret results and evaluate risk. WTM of command words percentage change, uncertainty, *Titration, Thermal conductivity.* Electrolysis.	Describe procedure, tangents, identify equipment, evaluation. Extended response unit conversion, Quantitative chemistry equations. Photosynthesis, IV characteristics, Resistance.	Unit conversion, evaluate experimental method, tables. RQP terminology practice Scatter graph interpretation, plotting graphs. Calculation of rate Reaction time, Rates of reaction.	Identify patterns in data, state relationships between variables. 4 mark questions with MS Proportion, multiplying fractions, *Tropisms*	Planning, interpret data, numeracy. 6-mark questions with MS Sample size calculations. *Field investigation,* waves speed, *refraction of light,* Infrared.
	Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	**4.1.2/4.2.3** building on THE CELLULAR BASIS OF LIFE (BI1) **5.2 and 5.1** building on the big ideas of BIG IDEA: PARTICLES AND STRUCTURE (CH2) and BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) **6.1** Building on the BIG IDEA: MATTER (PH1)	**4..2** building on THE CELLULAR BASIS OF LIFE (BI1) and BIG IDEA 5: HEALTH AND DISEASE (BI5) **5.4** building on the big ideas of BIG IDEA: CHEMICAL REACTIONS (CH3) and BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) **6.1** Building on the BIG IDEA: MATTER (PH1)	**4..4** building on THE CELLULAR BASIS OF LIFE (BI1) and HT2 plants and disease. **5.3** building on BIG IDEA: PARTICLES AND STRUCTURE (CH2) and BIG IDEA: CHEMICAL REACTIONS (CH3). **6.2** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4)	**4.5** building on the big idea THE CELLULAR BASIS OF LIFE (BI1) **5.6** building on BIG IDEA: CHEMICAL REACTIONS (CH3) **6.2** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4) and 6.3.3.2 building on pressure from year 8 HT6.	**4.5** building on the big idea THE CELLULAR BASIS OF LIFE (BI1) and photosynthesis from HT3. **5.7** building on the big idea BIG IDEA: EARTH'S ATMOSPHERE (CH4) **6.4** building on from BIG IDEA on MATTER (PH1) and particle model from HT3 Year 9.	**4.7** Building on the BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) from across the key stages. **5.7** building on the big idea BIG IDEA: EARTH'S ATMOSPHERE (CH4) **6.6** building on BIG IDEA: SOUND, LIGHT AND WAVES (PH3) from KS3 curriculum.

Year 11 Separate

Topic Title and NC link Biology 3 Chemistry 2 Physics 3	4.7 Ecology 5.8 Chemical Analysis 6.5 Forces	4.6 Evolution, variation and classification 5.9 Chemistry of the atmosphere 6.7 Magnetism	4.6 Evolution, variation and classification 5.10 Using Resources 6.8 Space	PPE Set 2 March Revision for paper 2s	**External Exams**	**External Exams**
Pupils should know… (Core knowledge and concepts to learned) *Italic – separate science only content.*	GCSE AQA Biology, Chemistry and Physics Specification. **Biology** • Water and carbon cycle • Effect of human population on the environment, • Global warming and maintaining biodiversity. • *Decay and food production.* **Chemistry** • Purity, formulations, chromatography, gas tests. • *Spectroscopy and flame emission spectroscopy*. **Physics** • Scalar and vectors qualities, mass, weight and gravity, vector diagrams, resolving forces, work done • Hooke's Law and elastic potential energy.	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Reproduction, meiosis, *DNA structure,* genetics • Evolution, variation, natural selection, classification. • *Development of genetics, speciation.* **Chemistry** • Development of the atmosphere, combustion, carbon foot print. **Physics** • Magnets, electromagnets, motors, F BIL. • *Induced potential, transformers and the national grid.*	GCSE AQA Biology, Chemistry and Physics Specification **Biology** • Genetic engineering, selective breeding, fossils, extinction. • *Cloning* **Chemistry** • Finite, renewable resources, waste water, copper extractions, LCA, reduce, reuse and recycle. • *Corrosion, alloys, ceramics, polymers and composites, Haber process fertilisers.* **Physics** • *Solar system, lifecycle of a star, satellites, red shift*.	Revision focus • Numeracy, literacy, RQP skills. • Command words using walking talking mocks. • Revision of knowledge mats at home. • Go over key weaknesses from previous years exams. • Revision plans for each class		
Pupils should be able to do… (Skills being developed…	Accurate measurements, hypothesis and conclusion. Describe the procedure Sample size, translate between graph and table, Rf values. Angles, Vectors, tangents, angles and equations. Chromatography, reaction time, plant sampling, *plant tropisms, Decay*. *Chemical tests.* Hooke's law	Methods, evaluating and improving methods, id patterns. Extended response questions Probability punnet squares, frequency, bar chart, histogram. RQP terminology focus.	State relationships between variables, evaluate conclusion WTM Command words Recall and manipulation 21 equations. Water purification.			
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	**4.7** Building on the BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) from across the key stages. **5.8** summaries and apply multiple topics from across KS3 and KS4 focus on building on all chemistry key principles CH1 – CH4. **6.5** Building on the BIG IDEA: FORCES AND MOTION (PH2) from year 8 and year 9.	**4.6** Building on BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) from year 7/8. **5.9** building on the big idea BIG IDEA: EARTH'S ATMOSPHERE (CH4). **6.7** building on the BIG IDEA: ELECTRICITY AND MAGNETISM (PH4).	**4.6** Building on BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) from year 7/8. **5.10** summaries and apply multiple topics from across KS3 and KS4 focus on building on all chemistry key principles CH1 – CH4. **6.8** building on BIG IDEA: EARTH IN SPACE (PH5).			

Year 12 Biology

Topic Title and NC link	2.1.2 Biological Molecules 2.1.5 Biological membranes 2.1.1 Cell Structure 2.1.3 Nucleotides and Nucleic Acids	2.1.5 Biological Membranes 2.1.4 Enzymes 2.1.6 Cell division, Cell diversity and cell organisation.	3.1.1 Exchange surfaces 4.1.1 Communicable disease, Disease and the immune system	3.1.2 Transport in Animals 3.1.3 Plant Transport 4.2.1 Biodiversity 4.2.2 Classification and Evolution	5.2.1 Photosynthesis 6.5 Ecosystems	5.7 Respiration 6.6 Populations and sustainability
Pupils should know… (Core knowledge and concepts to learned	Biological Molecules • Structure and formations of monomer units to form polymers carbohydrate, lipids, proteins and nucleic acids. • Proteins structure • Food Tests • TLC of amino acids Biological Membranes • Fluid mosaic model • Factors and investigations into membrane permeability. Cell Structure • Use and investigation into cell structure using the light microscope. • Biological drawings • Structure and function of organelles in prokaryotic and eukaryotic cells. Nucleotides and Nucleic Acids • Structure, function and formation of nucleotides and nucleic acids • Proteinsynthesis	Biological Membranes • Diffusion osmosis and active transport. • Practical investigation into water potential and osmosis. Enzymes • Role and structure of enzymes • Effect of pH, temp, enzyme concentration and substrate concentration on rate of reaction. • Coenzymes, cofactor and prosthetic groups • Inhibitors Cell division, diversity and organisation • Stages and significance of meiosis and mitosis • How cells in multicellular organisms are adapted to their function • Formation, use and ethics of stem cells in plants and animal cells.	Exchange surfaces • Structure, function and features of specialised exchange surfaces in mammals, fish and insects • SA:Vol • Ventilation in mammals, fish and insects . • Dissections and microscope study of exchange surfaces. Communicable diseases • Pathogens and transmission in animals and plants • Plant and animal defences against pathogens • Primary and secondary immune responses. • Vaccinations and sources of medicines. Biodiversity • Measuring and the importance of biodiversity • SDI and proportion of polymorphic gene loci • Maintaining biodiversity	Transport in Animals • Structure and function of transport systems in animals • Different types of circulatory system • Cardiac cycle • Oxygen dissociation curve Plant transport • Structure and function of transport in plants and vascular systems in xylem and phloem. • Transpiration and translocation. • Adaptations of xerophytes and hydrophytes. Biodiversity • Trip to Ainsdale and completion of PAG 3.1,3.2 and 3.3. Classification and Evolution • Natural selection, evolution and variation. • Classification of species • Classification and phylogeny	Photosynthesis • Structure and function of chloroplasts • LDR and LIR of photosynthesis • Use of TP • Factors effecting photosynthesis. Ecosystems • Abiotic and biotic factor • Sampling techniques • Biomass transfers through the ecosystem. • Nitrogen and carbon cycles • Primary succession	**Respiration** • Comparison of photosynthesis and respiration • Use of mitochondria • Process of respiration including Krebs cycle, link reaction • Practical investigations • Energy quotient **Populations and sustainability** • Factors effecting populations size #interdependence • Reasons and differences between conservation and preservation • Management of an ecosystem • Management and effect of environmental resources.
Pupils should be able to do… (Skills being developed…	PAG 9.1,9.2,9.3, PAG 5.1,5.2,8.1,8.2, Planning (a,b,c) Intervention with those below 5 in maths. MIA microscopes. Key word lists and definitions	PAG 8.1, 8.3, 6.1PAG 4.1, 4.2, 4.3 PAG 1.1 Implementing (a,b,c) Analysis (d) Percentage change, Q10 calculations, gradients, Biology long answer questions	PAG 1.3. PAG 1.2 Biological drawings Statistical tests, surface area: volume ratio, graph interpretation WTMS and command words	PAG 11.1, 2.1PAG 2.2, 5.3 PAG 3.1, 3.2, 3.3. Evaluation (d) Simpsons diversity index Describing methods (trip)	PAG 6.2 Implementation (a,b,c) Analysis(All) Percentage change and biomass. Linking terminology and key words	PAG 12.1 Evaluation (a, b,c,d,e) RQ for respiration Essay practice
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	Unit 2 build on the BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1) from KS4 including food test, monomers, diffusion, osmosis and active transport. They are also building their practical skill from the microscope RQP in year 9.	Unit 2 build on the BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1) from KS4 including enzymes, lock and key, experiments into pH and temperature. From KS4 pupils should also have a basic knowledge of mitosis and meiosis, diffusion, osmosis including RQP and active transport.	BIG IDEA 5: HEALTH AND DISEASE (BI5) from KS4 infection and response unit including WBC, pathogens and vaccinations. BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) has a knowledge of adaptations of plant and animals and maintaining biodiversity.	BIG IDEA 4: VARIATION, ADAPTATION AND EVOLUTION (BI4) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). From KS4 pupils should have a basic knowledge theory of natural selection, structure and function of the heart and translocation and transpiration in plants.	BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). 5.2 GCSE recall: the factors effecting photosynthesis and the photosynthesis experiment. 6.5 abiotic and biotic factors, carbon cycle and sampling and biodiversity from HT4.	BIG IDEA 3: ORGANISMS AND THEIR ENVIRONMENTS (BI3) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). **5.7 and 6.6 (**Biological Molecules), (Nucleotides) and (Enzymes) and to active transport, gas exchange, transport of respiratory gases and use of mitochondrial DNA analysis to elucidate evolutionary relationships

Year 13 Biology

Topic Title and NC link	5.1 Communications and homeostasis 5.2 Excretion 6.1 Cellular Control	5.4 Hormonal Communication 5.1.5 Plant hormones 6.2 Patterns of inheritance	5.5.3 Neuronal communication 5.1.5 Animal response 6.3 Manipulating genomes	5.5.5 Coordination of nervous and endocrine systems including HR. 6.4 Cloning and biotechnology	Revision Catch up PAGs HT5 Assessment – PPEs 3 papers, paper 1, paper 2 and unified	External Exams
Pupils should know… (Core knowledge and concepts to learned)	**Communications and homeostasis** • Internal and external communication systems • Cell signalling • Homeostasis principles • Temperature control in endotherms and ectotherms. **Excretion** • Structure and function of the kidney and liver • Control of water potential • Effects of kidney failure and treatment. • Excretory products in medical diagnosis. **Cellular control** • Types of mutations • Control gene expression at transcription and translation level	**Hormonal communication** • Endocrine communication by hormones. • Histology of the pancreas and structure and function of adrenal glands • Diabetes and control of blood glucose. **Plant hormones** • Plant responses to hormones and the role of auxin • Tropisms experiments • Commercial uses of plant hormones. **Patterns of inheritance** • Types and controls of variation • Genetic diagrams and ratios • Genetic effect on classification and evolution.	**Neuronal Communication** • Roles of receptors and neurones • Transmission and generation of neural impulses **Animal response** • Organisation and structure of the human brain and its parts. • Reflex actions **Manipulating genomes** • Principled of DNA sequencing and profiling • PCR and its application s • Uses of gel electrophoresis • Genetic engineering and ethical evaluation • Principles and potential of gene therapy	**Coordination of nervous and hormonal systems** • Coordination and response of nervous and endocrine systems • Effect of nervous and hormonal systems on the heart. • Muscular contraction **Cloning and biotechnology** • Natural and artificial cloning in plants and animals • Evaluation of artificial cloning • Processes and uses of biotechnological processes and its evaluation. • Culturing of microorganisms and the growth curve. • Immobilisation of enzymes.		
Pupils should be able to do… (Skills being developed…	PAG 12.1, 10.2 Planning and implementation (a,b,c) Extended response bio terminology	Research and referencing (h, i) Genetic diagrams Key word dictionary	Pag 11.1, 11.2 PAG 7.1, 7.2 Instruments and equipment (j) WTM separate papers	Application (g) WTM and unified questions		
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). **5.1** Year 1 Recall: 2.1.4 enzymes, 2.1.5 biological membranes (cell signalling) 4.1.1 disease (cell signalling) **5.2** Year 1 Recall: PAG 1 microscopy, PAG 2 dissection, 2.1.5 biological membranes (water potential), 3.1.1 exchange surfaces, 4.2.2 animal adaptations. **6.1** Year 1 Recall: understanding of the structure of DNA, 2.1.3(a)–(d) and proteins, 2.1.2(k)-(m). A secure grasp of the genetic code and protein synthesis, 2.1.3(f)-(g).	BIG IDEA 2: HEREDITY AND LIFE CYCLES (BI2) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1) **5.4 and 5.1.5** Year 1 Recall: PAG 1 microscopy, PAG 2 dissection, 2.1.2 proteins, 2.1.5 biological membranes (cell surface receptors), 3.1.2 transport in animals, 4.1.1 communicable diseases. **6.2** Year 1 Recall: 2.1.3 Nucleotides and nucleic acids, 2.1.6 meiosis and variation, 4.2.1 biodiversity, 4.2.2 Natural selection and evolution, maths skills: manipulating formulae, using statistical tests.	BIG IDEA 2: HEREDITY AND LIFE CYCLES (BI2) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). **5.3 and 5.1.5**-year 1 recall biological membranes, enzymes, biological membranes and ECGs of the heart and heart muscle. **6.3** Year 1 Recall: 2.1.3(a)–(d) understanding of the structure of DNA, , 2.1.2(k)-(m) and proteins 2.1.3(f)-(g), the genetic code and protein synthesis, 4.2.1(e) detection of polymorphic alleles by electrophoresis, 4.2.2whole genome comparisons.	BIG IDEA 2: HEREDITY AND LIFE CYCLES (BI2) and BIG IDEA 1: THE CELLULAR BASIS OF LIFE (BI1). **5.5** nucleotides and nucleic acids, membranes and molecules. 5.3 and 5.4 from year 2. 6.4Year 1 Recall: using a graticule, structure of DNA and replication, protein synthesis, enzymes, the cell cycle, mitosis and stem cells, spread of plant and animal disease in cloned populations, the reason for the goal of making replacement organs via non-reproductive cloning, antibiotics, genetic variation.		

Year 12 Chemistry	*Topic Title and NC link*	2.1.1: Atomic structure and isotopes 2.2.1: Electron structure 2.1.3: Amount of substance 2.1.2: Compounds, formulae & equations 2.2.2: Bonding and structure	2.1.5: Redox 3.1.1: Periodicity 3.1.2: Group 2 3.1.3: The halogens	3.1.4: Qualitative analysis 3.2.2: Reaction rates 4.2.1: Alcohols 4.2.2: Haloalkanes 4.2.3: Organic synthesis	3.2.2: Reaction rates 5.1.1 How fast? 6.3.2 Spectroscopy 6.1.2 Carbonyl compounds	5.3.1 Transition elements 5.3.2 Qualitative analysis 4.2.4: Analytical techniques 6.3.1 Chromatography and qualitative analysis	3.2.3: Chemical equilibrium 5.1.2 How far? 6.1.1 Aromatic compounds Trip to university preparation
	Pupils should know… (Core knowledge and concepts to learned	**The building blocks of A Level chemistry** **Atomic structure and isotopes** • Atomic structure and isotopes • Relative mass **Compounds, formulae and equations** • Formulae and equations **Amount of substance** • The mole • Determination of formulae • Calculation of reacting masses, gas volumes and mole concentrations • Percentage yields and atom economy **Electron structure** • Energy levels, shells, sub-shells, atomic orbitals, electron configuration **Bonding and structure** • Ionic bonding • Covalent bonding • The shapes of simple molecules and ions • Electronegativity and bond polarity • Intermolecular forces	**Redox** • Oxidation number • Redox reactions **Periodicity** • The structure of the periodic table • Periodic trend in electron configuration and ionisation energy • Periodic trend in structure and melting point **Group 2 The halogens** • Redox reactions and reactivity of Group 2 metals • Reactions of Group 2 compounds • Characteristic physical properties • Redox reactions and reactivity of halogens and their compounds **Basic concepts and hydrocarbons** • Naming and representing the formulae of organic compounds • Functional groups • Isomerism • Reaction mechanisms **Alkanes Alkenes** • Properties of alkanes • Reactions of alkanes • Properties of alkenes • Stereoisomerism in alkenes • Addition reactions of alkenes • Polymers from alkenes	**Qualitative analysis** • Tests for ions **Reaction rates** • Simple collision theory • Catalysts • The Boltzmann distribution **Alcohols** • Properties of alcohols • Reactions of alcohols **Haloalkanes** • Substitution reactions of haloalkanes • Environmental concerns from use of organohalogen compounds **Organic synthesis** • Practical skills • Synthetic routes	**How fast** • To determine orders of a reaction, rates and overall order from data • To determine rate determining step • The effect of temperature on rate constants **Spectroscopy** • NMR Spectroscopy **Carbonyl compounds** • Reactions of carbonyl compounds • Characteristic tests for carbonyl compounds	**Transition elements** • Properties • Ligands and complex ions • Ligand substitution • Precipitation reactions • Redox reactions **Qualitative analysis** • Tests for ions **Analytical techniques** • Infrared spectroscopy • Mass spectrometry • Combined techniques **Chromatography and qualitative analysis** • Types of chromatography • Tests for organic functional groups	**Chemical equilibrium** • Dynamic equilibrium and le Chatelier's principle • The equilibrium constant, K_c **How far** • Equilibrium • Equilibrium constants and their significance **Aromatic compounds** • Benzene and aromatic compounds • Electrophilic substitution
	Pupils should be able to do… (Skills being developed…	PAG 1.1 Intervention with those below 5 in maths. Moles calculations Key word lists and definitions	PAG 2.1 & 2.3 Calculations of sources of error Written explanations of organic mechanisms	PAGs 4.1, 4.2 PAG 5.1 Calculation of rate of reaction and analysis of Boltzmann graphs. Correct recording of qualitative observations	PAGs 9.1, 9.2, 10.3 Measurement and calculation of rate of reaction Written analysis of NMR data	Calculation of Mr using mass spectrometry	PAGs 6.1, 7.1, 7.2, 7.3 Units of equilibrium constants Detailed write up of organic synthesis experiments
	Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	These topics are underpin the whole A level and students must have a detailed understanding of them to enable them to access the rest of the course. There is overlap between GCSE and these topics build on students prior work. BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials.	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials BIG IDEA: CHEMICAL REACTIONS (CH3) - During a chemical reaction, atoms are rearranged forming new substances.	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials BIG IDEA: EARTH'S ATMOSPHERE (CH4) - The composition of the Earth's atmosphere depends upon the balance of substances that are continually entering and leaving it. This affects the Earth's climate.	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: CHEMICAL REACTIONS (CH3) - During a chemical reaction, atoms are rearranged forming new substances.	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials	BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials BIG IDEA: CHEMICAL REACTIONS (CH3) - During a chemical reaction, atoms are rearranged forming new substances.

Year 13 Chemistry

Topic Title and NC link	2.1.4: Acids 5.1.2 Acids, bases and buffers 6.1.1 Aromatic compounds 6.1.3 Carboxylic acids and esters	3.2.1: Enthalpy changes 5.2.1 Lattice enthalpy 5.2.2 Enthalpy & Entropy 6.2.1 Amines 6.2.2 Amino acids, amides and chirality 6.2.3 Polyesters and polyamides 6.2.4 Carbon–carbon bond formation	5.2.3 Redox and electrode potentials 6.2.5 Organic synthesis 6.2.11 Synthetic routes in organic synthesis Revisiting 6.3.5 Proton NMR spectroscopy 4.2.4: Analytical techniques	5.3.7 Redox reactions 5.3.8 Testing for ions PAG 12 6.3.7 Combined techniques	**Revision for Paper 1** Redox titrations Year 12 enthalpy calculations Year 12 calculations – gases and water of crystallisation Ionic and covalent bonding, shapes of molecules Periodicity, ionisation energies, trends in melting points and electrical conductivity **Revision paper 2 and unified** Completion of PAG revision 1-11 • Review of PAG equipment • Methods • PAG skills • Old Task questions • MCQ • Long Exam questions	External Exams
Pupils should know… (Core knowledge and concepts to learned)	**Acids** • Acids, bases, alkalis and neutralisation • Acid–base titrations **Acids, bases and buffers** • Bronsted-Lowry acids and bases • Acids base reactions and K_a • Calculating pH of strong and weak acids • The ionisation of water and K_w • Uses of buffers and their related calculations • Neutralisation – pH titration curves, uses of indicators and use of pH probes **Aromatic compounds** • Benzene and aromatic compounds • Electrophilic substitution • Phenols **Carboxylic acids and esters** • Properties of carboxylic acids • Esters • Acyl chlorides	**Enthalpy changes** • Enthalpy changes: ΔH of reaction, formation, combustion and neutralisation • Bond enthalpies • Hess' law and enthalpy cycles **Lattice enthalpy** • Lattice enthalpy • Born-Haber cycles • Enthalpy change of solution and hydration **Enthalpy & Entropy** • Entropy • Free energy **Amines** • Basicity and preparation of amines **Amino acids, amides and chirality** • Reactions of amino acids • Amides • Chirality **Polyesters and polyamides** • Condensation polymers **Carbon–carbon bond formation** • Extending carbon chain length	**Redox and electrode potentials** • Redox • Redox titrations • Electrode potentials • Storage and fuel cells **Organic synthesis** • Practical skills • Synthetic routes **Spectroscopy** • NMR Spectroscopy **Analytical techniques** • Infrared spectroscopy • Mass spectrometry	• Combined techniques **PAG 12.1** Completion of PAG revision 1-11 • Review of PAG equipment • Methods • PAG skills • Old Task questions • MCQ • Long Exam questions	
Pupils should be able to do… (Skills being developed…	**PAG 11.1** Measurement of pH pH calculations Laying out longer written answers from exam questions	**PAG 3.1, 3.2, 3.3** Measurement of temperature Hess cycle and Born Haber cycles Laying out longer written answers from exam questions	**PAG 8.1** Exam technique practice of all calculation questions Written analysis of NMR data and combined technique analysis	**PAG 12.1** Exam technique practice of all calculation questions Research skills and the correct citing of sources of information		
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: CHEMICAL REACTIONS (CH3) - During a chemical reaction, atoms are rearranged forming new substances.	BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials. BIG IDEA: CHEMICAL REACTIONS (CH3) - During a chemical reaction, atoms are rearranged forming new substances.	BIG IDEA: SUBSTANCES AND PROPERTIES (CH1) - Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties. BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials	BIG IDEA: PARTICLES AND STRUCTURE (CH2) - All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials		

Year 12 Physics

Topic Title and NC link	4.1 Electric Current 4.2 Electrical Properties 2. Foundations of Physics 3.1 Motion	4.2 Electrical Properties 4.3 Electrical Circuits 3.1 Motion 3.2 Forces in Action (3.2.1,3.2.2, 3.2.4)	4.4 Waves (4.4.1 to 4.4.3) 3.2 Forces in Action (3.2.3) 3.3 Work Energy Power	4.4. Waves (4.4.3 to 4.4.4) 3.4 Materials	4.5 Quantum Physics 6.4.1-6.4.2 Nuclear & Particle Physics 3.5 Newton's Laws	6.4.2 -6.2.4 Particle Physics, Nuclear Fission and Fusion 5.5 Astrophysics (5.5.1-5.5.2)
Pupils should know… (Core knowledge and concepts to learned)	Electrical Current: • Definition, description, examples of electric current • conservation & quantisation of charge • Drift velocity of charge carriers Electrical Properties: • Concepts of emf and PD • Definition of resistance • IV characteristics of different electrical components • Resistivity of a material and how to determine it Foundations of Physics: • Quantities, SI units & base SI units, homogeneity, prefixes • Absolute, percentage uncertainties, combining uncertainties, best and worst fit • Scalars, Vectors and resolving vectors into components Motion: • Definitions of quantities such as displacement, velocity, speed • Distance & velocity time graphs • SUVAT equations incl freefall • Determining g experimentally	Electrical Properties • Internal resistance, lost volts, emf vs terminal pd. • Investigating int resistance and max power of a cell. • Electrical Power and energy. cost of electrical energy Electrical Circuits: • Kirchhoff's Laws for series, parallel and hybrid circuits. Effective resistance • Circuit problems with more than one source of emf • Potential Divider circuits • Using potential dividers as sensing circuits. Motion: • Stopping distances • Projectile motion Forces in Action • Names of forces, mass vs weight, free body diagrams • Drag, terminal velocity • Density, pressure in liquids, Archimedes principle	Waves: • Transverse vs Longitudinal wave profiles, period, frequency, speed etc • Using Oscilloscopes • Reflection, Refraction and Diffraction of Waves • Polarisation of Waves • Properties of EM waves • Refraction and total internal reflection of light • Principle of Superposition, phase and path difference Forces in Action: • Moments, couples and torques • Centre of mass • Equilibrium problems using principle of moments • Triangle of forces for equilibrium Work, Power and Energy • Work done, • Conservation of energy • "forms/ "stores" of energy • GPE to KE transfers • Power, efficiency	Waves: • Interference patterns for sound and microwaves • Young's Double slit and Diffraction grating • Stationary Waves, patterns for strings, open air columns and closed air columns. Materials: • Force vs extension/ compression, Hooke's Law, Spring Constant, Elastic Potential Energy • Stress, Strain, Tensile Strength and Young's Modulus • Elastic vs Plastic Deformation	Quantum Physics: • The photon, energy of a photon, photons and LEDs, determining the Planck Constant • The Photoelectric effect and Einstein's explanation of it • Wave-Particle Duality Nuclear and Particle Physics: • Properties of the nucleus, radius, density, etc • Alpha scattering experiment • Strong Nuclear Force Newton's Laws: • Newton's Laws of motion • Momentum • Force is rate of charge of momentum • Impulse and understanding force-time graphs • Conservation of momentum in collisions. Elastic vs non-elastic collision.	Particle Physics, Fission and Fusion • Matter and Antimatter • Classification of matter into hadrons and leptons, weak and strong nuclear force • Quark Model including properties of u, d, s quarks • Beta minus and beta plus decay in terms of quarks • Quark transformation equations • Mass energy equivalence, mass defect • Binding energy in nuclei • Fission and fusion – including fission reactors and impact of waste Astrophysics: • Objects in the Universe • Evolution of a star – how a star forms, fusion in main sequence, etc • Properties of white dwarfs, neutron stars and black holes • Chandrasekhar limit and degeneracy pressure • HR diagrams • Energy levels in atoms • Absorption and Emission spectra • Black Bodies, Wien's Law and Stephan's Law- radius of a star
Pupils should be able to do… (Skills being developed…	PAG3: 3.2 IV characteristics 3.1 Resistivity PAG1: 1.1 Determining g 1.3 Stopping Distance Teacher 1: Significant Figures .Scale factors, "Ratios" and proportions in Physics Volumes, areas of shapes. Teacher 2: Prefixes and Standard form, Units Interpreting kinematic graphs, rearranging equations. Using Teacher notes to obtain information and apply it	PAG 3: 3.3 Internal Resistance and Max Power of a cell PAG 4: 4.2 More than 1 source of emf 4.1 Potential Divide 4.3 Sensing Circuits PAG1: 1.2 Terminal Velocity Teacher 1: Rearranging equations, multistep Setting up useful graphs Interpreting Y=mx+c graphs Teacher 2: Gradients, including tangents Resolving, basic trigonometry, Using Textbook (and online resources) to obtain information and apply it	PAG5: 5.3 Oscilloscope PAG6: 6.3 Experiments with Polarisation 6.2 Investigating properties of light (refraction) Teacher 1: Trig and inverse trig functions Measuring and determining angles - radians vs degrees. Teacher 2: Resolving, free body diagrams and scale drawings Learning Definitions of key terms	PAG5: 5.1 Young's Double Slit and Diffraction Grating 5.2 Stationary Waves on a string and in air columns. PAG2 2.2 Hooke's Law 2.1 Young's Modulus 2.3 Properties of Plastics Teacher 1: Prefixes and standard form, unit conversions Teacher 2: Setting up useful graphs Interpreting Y=mx+c graphs Answering method questions based on PAGs/practicals	PAG6: 6.1 Determining Planck's constant Teacher 1: Ratios, scale factors and proportions Teacher 2: Interpreting graphs, estimating gradient, estimating area Exam technique: Understanding key command words in extended response questions	**Teacher 1:** Order of magnitude calculations **Teacher 2:** Ratios, scale factors and proportions. Logarithmic Scales Exam technique: Condensing and linking content into concise answers

Year 13 Physics

Why are we doing this now? How does this build on prior knowledge and the knowledge still to come??	Electric current – builds upon basic definitions from GCSE -and is the basis of all the rest of electricity topic Foundations of Physics: These skills are required for every subsequent topic. Units etc were seen at GCSE but other things such as homogeneity and base SI are new Motion – similar to GCSE but much more precise . Good topic to assess numerical and practical skills	Electrical Properties –lots of familiar topics from GCSE but resistivity and internal resistance are new topics with lots of additional science (practical, ratios, equations, micrometers, choice of graph) Electrical Circuits – formalises the GCSE work on series and parallel circuits, and potential dividers, and gives students first opportunity to do investigative and research practicals. Forces in Action in HT2 again builds upon ideas of drag, terminal velocity, density and pressure. The order here allows relatively east topics within Forces in action to be taught together	Waves – again starts off with familiar ideas from GCSE, but we then build up to discussing polarisation, which is new. The GCSE knowledge of refraction will aid students when we look at refraction and TIR of light. Forces in Action time is given here to look at moments, and equilibrium problems, an area students have struggled on in the past. Work on resolving in HT1 will aid a lot. Work power and energy is very similar to GCSE, with little extra. Some of it also covered in electrical properties.	Waves in HT4 is devoted to two classic and traditionally tough topics. The work at the end of HT3 on interference will aid greatly. Understanding this topic will also allow students to understand topics in astrophysics. Materials is given a whole half term to itself, as there are a lot of new ideas (Stress, strain, YM) as well as ideas from GCSE (Hooke's Law). There are many practicals, and opportunities for investigative and research work.	Quantum Physics builds upon the last bit of work in waves, and is essential for understanding topics in HT6 and in Year 13. It presents us with a practical that has many facets to it, to improve various skills. Newton's Laws is the last bit of forces – it builds upon GCSE knowledge, HT2 knowledge but also has notoriously difficult concepts such as impulse and graphs. Understanding this will aid for understanding the forces topics in Y13.	**Nuclear/Particle Physics** – an interesting look at modern physics for the students, with opportunities to do research. Topics work well with astrophysics and quantum Physics. Radioactivity part of this topic saved for Y13 as additional maths required and also knowledge of molar masses **Astrophysics** provides a particularly interesting end to the year for the students, with opportunities for research and wider reading. The topics covered feature content recently learned in Quantum Physics (HT5) as well as crossover from Nuclear & Particle Physics
Topic Title and NC link	6.1 Capacitors 6.2 Electric Fields 5.5.3 Cosmology 5.1 Thermal Physics	6.2 Electric Fields 6.4.3 Radioactivity 5.1 Thermal Physics 5.2 Circular Motion	6.3 Electromagnetism 5.3 Oscillations	6.5 Medical Imaging 5.4 Gravitational Fields		
Pupils should know… *(Core knowledge and concepts to learned)*	Capacitors • What a capacitor is and does • Capacitance, capacitors in series and parallel • Work done and energy stored in a capacitor • Discharging and charging capacitors- exponential decay • Uses of capacitors Electric Fields: • Nature of electrostatic force • Coulomb's Law • Electric Field Strength • Electrostatic Potential Energy and Electric field strength Cosmology • Light year, parsec, Stellar parallax • Cosmological principle • Redshift, Hubble's Law and the Age of the Universe • The Big Bang theory, The CMB • Evolution of Universe ideas about Dark matter and energy Thermal Physics: • Temperature, the Kelvin • Particle model of matter • Internal energy, changes in temperature and phase • Specific Heat Capacity and Specific Latent heat	Electric Fields: • Uniform fields and link to capacitance • Motion of charged particles in a uniform electric field Radioactivity • Nature and properties of alpha, beta, gamma • Nuclear Decay equations, decay chains, stability • Randomness, Activity, half-life, decay constant, exponential decay, • Carbon Dating Thermal Physics: • The mole, molar mass • Kinetic theory for Ideal gases • Equation of state for ideal gas, and the individual laws (Boyle's, Charles' etc), absolute zero • Microscopic equation of state – rms speed, Boltzmann constant • Maxwell Boltzmann distributions. Circular Motion • The radian, angular velocity, period, frequency • Centripetal acceleration, centripetal force	Electromagnetism: • Magnetic fields, magnetic forces, motor effect, motor • Motion of charged particles in magnetic fields • Electromagnetic Induction – faraday's/Lenz's law and generators • Transformers Oscillations: • Period, frequency, angular frequency of oscillations • SHM – defining equation, examples of SHM, equations for SHM • Graphs of SHM • Energy transfer in SHM • Damping • Free and forced oscillations, resonance	Medical Imaging • Properties of X-rays, how X-rays are created • Attenuation of X-rays, contrast media • Medical tracers, working of the gamma camera, PET scanning • Ultrasound, Piezoelectric effect, acoustic impedance, matching • Doppler effect with ultrasound Gravitational Fields • Nature of gravitational force • Newton's Law of gravitation • Gravitational Field Strength • Kepler's Laws for Planetary motion • Gravitational potential and potential energy • Escape velocity		

Pupils should be able to do… (Skills being developed…	**PAG9:** **9.2 Capacitors In series and parallel** **9.1 Charging and Discharging of Capacitors** **PAG11 (investigation):** **11. 2 Specific Heat Capacity** **Teacher 1:** Exponential decay formulae, logarithms and logarithmic graphs **Teacher 2:** Unit conversions (ly to pc, Hubble constant etc) Error analysis Planning an investigation – outlining the decisions made	**PAG9: 9.3 Electric Field between plates** **PAG 7 : 7.2 Absorption of alpha beta gamma** **7.3 Half life of a source** **PAG8:** **8.2 Boyle's Law** **8.1 Absolute Zero** **Teacher 1:** Exponential decay formulae, logarithms and logarithmic graphs **Teacher 2:** Ratios and scale factors (ideal gas law equations) Extrapolating data. **A**alysing and evaluating practical work including accuracy and precision.	**PAG 11 (investigation): 11.1 Investigating Transformers** **11.3 Magnetic Field of a magnet** **PAG10: 10.1 Investigating SHM** **10.2 Free and forced oscillations** **Teacher 1:** Finding rates of change from a graph, qualitatively describing rate of change **Teacher 2:** Sinusoidal equations (SHM), qualitatively interpreting rate of change on different graphs Writing methods for extended response type questions	**Teacher 1:** Exponential Decay formulae, logarithmic graphs **Teacher 2:** Multistage calculations (circular + gravitational) Summarising and condensing content into concise answers (exam technique)
Why are we doing this now? How does this build on prior knowledge and the knowledge still to come?	**Capacitors** – Builds upon the ideas learned in the electricity topic, and has many practicals to assess students skills. It will introduce the idea of spreadsheet modelling, used in radioactivity later. It also has the maths of exponential decay- which will be encountered twice more in the course. **Cosmology** builds on the astrophysics and particle physics done at the end of Year 12 **Thermal Physics** – in HT1 builds upon GCSE knowledge of the particle model and internal energy, and offers students the chance to do investigative work.	**Electric fields** introduces the ideas of fields, which will be used in electromagnetism and in gravitational fields. The topic builds upon the ideas learned in capacitors topic & equations learned in forces in y12. **Radioactivity** finishes off the topic started in HT6 of Year 12. Equipped with knowledge of molar masses from thermal physics, and exponential decay from capacitor. **Thermal Physics in ht2** is all about ideal gases. Students' will build upon their GCSE knowledge of gas pressure and also content learned in A level chemistry. The concepts of molar masses will be useful later in the radioactivity topic, and rms speed in gravitational fields. **Circular motion** is a short topic in itself, but is essential to a lot of other topics, particularly gravitational fields and electromagnetism. A good understanding of Newton's Laws from Y12 is needed.	**Electromagnetism** uses some GCSE content and extends to include forces on charged particles and faraday's law. the knowledge learned in circular motion will aid with this content. Also the analysis of rates of change of graphs is similar to what is being studied in oscillations **Oscillations** – builds upon some concepts learned in waves and in circular motion. It is practical heavy, and has unfamiliar maths, so needs a full HT to get complete	**Medical Imaging** – builds upon a lot of the content learned in waves and quantum physics is year 12, but also radioactivity earlier in Year 13. Maths from Capacitors topic will also aid. Opportunity for extended writing makes it useful for a topic near the exams. **Gravitational fields** – will build upon the circular motion topic, and also the parallels with electric fields. It will also take content from thermal physics – RMS speed.

Year 12 BTEC	*Topic Title and NC link*	Unit 2, Assignment C, Chromatography Unit 2, Assignment A, Titration and Colorimetry (plus some Unit 1B Chem necessary for this) Unit 3, Assignment F: Plants Unit 4, Assignment A: Health and Safety in Scientific Organisations	Unit 4, Assignment B: Manufacturing techniques - liquid Unit 2, Assignment A, Titration and Colorimetry Unit 2, Assignment B – Cooling Curve Unit 3 Assignment F: Plants Assignment D: Enzymes Unit 3 Assignment E: Diffusion in Molecules	Unit 4, Assignment C: : Manufacturing techniques - solid Unit 2, Assignment B – Cooling Curves Unit 2, Assignment D Unit 3 Assignment E: Enzymes Unit 3 Assignment G: Energy in Fuels	Unit 4, Assignment D: Storing and managing data Unit 1C Physics Unit 1A Biology Unit 3 Assignment H: Electrical Circuits	Unit 1B Chemistry **Unit 1C Physics** Unit 1A Biology Prep and carrying out of Unit 3 Unit 6 Assignment A	1B Chemistry Unit 5B Chemistry (A.1) **Unit 1C Physics** Unit 5C Physics (C.2) Unit 1A Biology Unit 5B Biology (B.1) Unit 6, Assignment A
	Core Knowledge/ Concepts	Teacher 1: Safety in Chemistry Practicals, Theory and Practical Skills for different types of chromatography. Rf values Teacher 2: Moles, Concentration of Solutions, Safety in Chemistry Practicals Making solutions, Calibrating equipment, Basics of Acid Base reactions, titrations using indicators, using pH probes, Teacher 3: Planning/carrying out investigations into factors affecting plant growth and how to sample. Teacher 4: Health and Safety in Scientific Organisations. Hazards in Scientific Organisations	Teacher 1: Manufacturing techniques for different liquids, testing the liquids, evaluating techniques Teacher 2: , colorimetry, Accuracy and precision, evaluating results Temperature, particle model, State changes, heating and cooling curves, rates of change and tangents Teacher 3: Planning and carrying out investigations into enzyme structure, rates of reaction and factors affecting enzyme activity. Teacher 4: Planning and carrying out investigations into factors affecting the rate of diffusion	Teacher 1: Manufacturing techniques for different solids, how the techniques are done industrially, how to test for purity Teacher 2: rates of change and tangents, internal energy Reflecting on practical skills learned Teacher 3: Planning and carrying out investigations into enzyme structure, rates of reaction and factors affecting enzyme activity. Teacher 4: Planning and carrying out investigations into energy released by different fuels, and the hazards of each type of fuel	Teacher 1: Systems for storing and managing data in a lab, how labs communicate their data to others, benefits and risk of availability of data Teacher 2: Wave properties, wave speed, refraction/TIR, structure of fibre optics, digital and analogue signals, EM spectrum, Uses of EM waves, Teacher 3: Cell theory, organelles in different organisms, gram staining, magnification of cell images, specialised cells Teacher 4: Planning and carrying out investigations into designing circuits, power and energy transfer in circuits	Teacher 1: Electronic structure, types of bonding and intermolecular forces, reacting masses calculations, percentage yields Teacher 2: Inverse square formula for intensity, Superposition of waves, interference, use in diffraction gratings, stationary waves Teacher 3: structure of epithelial tissue, endothelial tissue, muscular tissue and nervous tissue Teacher 4: sources of information, citation, obtaining info from sources Making a proposal and identifying limitations	Teacher 1: Chemical and Physical properties (periodicity) Properties production uses of chemicals such as alumina, metal oxides, transition metals. Electrolysis and other techniques of extraction Teacher 2: Properties of materials Stress, strain, Young's Modulus, Hooke's Law, Elastic Energy Teacher 3: Structure and function of the Heart, characteristics of Blood vessels, cardiac cycle, use of ECGs, risk factors for CVD, treatments for CVD Teacher 4: sources of information, citation, obtaining info Making a proposal and identifying limitations
	Pupils should be able to do… (Skills being developed…	**Teacher 1:** Unit 2, Assignment C- submitted by week 8 (7th full week) Analysing and evaluating accuracy (% errors etc) and precision Mean and Range, Percentage Error Report Writing **Teacher 2 :** Risk assessment, Units and Unit conversions. evaluating safety aspects Report Writing **Teacher 3** Exams Extended writing Skills. Planning Investigations A **Teacher 4:** Computer/IT skills - Word	**Teacher 1:** Unit 4, Assignment B- submitted by week 7 Analysing and evaluating accuracy (% errors etc) and precision Mean and Range, Percentage Error Report Writing **Teacher 2:** Unit 2, Assignment A- submitted by week 5 Repeatability and Reproducibility (analysing other groups). Suggesting improvements Scientific Explanations Graph drawing Calculating gradients **Teacher 3:** Planning Investigations (A Exams Extended writing skills **Teacher 4:** Unit 4, Assignment A- submitted by week 1 standard deviation, error bars Processing Data (B) –	**Teacher 2:** Unit 2, Assignment B- submitted by week 4 **Teacher 3;** Drawing Conclusions (C) interpretation of statistical tests Command words **Teacher 4:** Processing Data (B) statistical tests	**Teacher 1:** Unit 4, Assignment C- submitted by week 1 Data handling and using software to collect and store data. Computer/IT skills - Excel **Teacher 2:** Unit 2, Assignment D- submitted by week 1 Rearranging formulae **Teacher 3:** Drawing Conclusions (C) Fractions, Percentages and Ratios Command words **Teacher 4:** Processing Data (B)	**Teacher 1:** Unit 4, Assignment D- submitted by week 1 Significant figures and standard form **Teacher 2:** Rearranging formulae **Teacher 3:** Fractions, Percentages and Ratios **Teacher 4:** Researching and Citation	**Teacher 2:** rearranging formula, areas under graphs **Teacher 3:** Data and graph skills **Teacher 4:** Researching and Citation Structuring a literature review Unit 6 Assignment A, handed in by week 6
	How does this build on prior knowledge &the knowledge still to come?	Unit 3 Practical Skills built from GCSE. Much of theoretical knowledge is GCSE knowledge. Unit 2 Skills are useful for unit 6 Unit 4 will give learners first opportunity to write assignment	Unit 4 Assignment B and C follow on nicely from Unit 2 Assignment C Skills learned in Assignment A useful for Unit 2 Assignment B.	Unit 2 Assignment D summarises work done in A.B and C Evaluation useful for doing Unit 6	Unit 1 Biology and Physics built up from GCSE knowledge Unit 4, Assignment D – skills links to assignment A (research, case studies etc)	Unit 1 Chemistry – some of this builds upon GCSE, but some also builds upon Unit 2, Assigments A and C Unit 6- skills developed now to aid learners to do lit review in HT6. Unit 3 will also aid their practical knowledge for this	Unit 5- first part of this unit – building on concepts done in Unit 1 Unit 6 – building on skills learned in Unit 2, 3 and 4.