

Curriculum Map

Subject: KS5 level 3 Applied science

	Year 12		Year 13	
	Teacher 1 (50% of year 12)	Teacher 2 (50% of year 12)	Teacher 1 (66% of year 13)	Teacher 2 (33% of year 13)
<p>Content- WHAT will be learned? What previous learning can be linked? Why this order/sequence ?</p>	<p>Reinforces prior learning from GCSE on structure of the atom and bonding types. Extends learning into subshells and Aufbau principle (AS level). Learning Aims are interleaved with content learning. Moles calculations are revisited and applied in the context of titration, which may be unfamiliar to those who have not studied triple science. A level concepts such as ionisation energies, oxidation states and periodicity are introduced.</p> <p>Unit 1: Periodicity and properties of elements A1 Structure and bonding</p> <ul style="list-style-type: none"> Structure of the atom Electronic structure Isotopes and calculations of Relative Atomic Masses (A_r) Types of bonding Intermolecular forces and 3D shape <p>Unit 2 Scientific procedures and techniques B. Undertake calorimetry to study cooling curves</p> <ul style="list-style-type: none"> First Learning Aim – follows on from intermolecular forces and changes of state <p>Unit 1: Periodicity and properties of elements A1 Structure and bonding</p> <ul style="list-style-type: none"> Intermolecular forces revisit and introduction to polar/non-polar solvents and chromatographic techniques <p>Unit 2 Scientific procedures and techniques C. Undertake chromatographic techniques to identify components in mixtures</p> <ul style="list-style-type: none"> Application of intermolecular forces to chromatography <p>Unit 1: Periodicity and properties of elements A1 Structure and bonding</p> <ul style="list-style-type: none"> Calculations of moles and reacting masses Concentration in mol/dm^3 and titration procedures <p>Unit 2 Scientific procedures and techniques A. Undertake titration and colorimetry to determine the concentration of solutions</p> <ul style="list-style-type: none"> Application of content to titration analysis <p>Unit 1: Periodicity and properties of elements A2 Production and uses of substances in relation to properties</p> <ul style="list-style-type: none"> Ionisation energies Reactivity of metals with oxygen Changes in properties across a period Displacement Oxidation states <p>Unit 2 Scientific procedures and techniques D. Review personal development of scientific skills for laboratory work</p> <ul style="list-style-type: none"> Students reflect on scientific skills shown through their learning aims and how they have developed, whilst considering the skills needed for a range of careers in science. 	<p>Builds on GCSE science developing knowledge and practical skills in the areas itemised below. Knowledge is extended up to A2 level in some topics. This can be taught Biology then Physics or vice versa. There is no defined order.</p> <p>Unit 1 Biology: Structure and functions of cells and tissues</p> <p>B1 Cell structure and function</p> <ul style="list-style-type: none"> Cell theory Ultrastructure and function of organelles Microscopy – light and electron Magnification calculations. Comparison plant and animal cells Gram positive and negative bacteria <p>B2 Cell specialisation</p> <ul style="list-style-type: none"> Palisade mesophyll, sperm, egg, root hair cell, white blood cell. Red blood cell 	<p>This unit develops the practical, analytical and evaluative skills associated with the successful application of the scientific method. This is done through the study of 5 key themes. The emphasis is on completion of multiple investigations within each theme to expose the students to as many approaches as possible in readiness for final exams. These can be taught in any order. We generally start with Plants and use the opportunity of a joint field trip with the A level biology students in the summer months.</p> <p>Unit 3 Science Investigation Skills.</p> <p>A Planning a scientific investigation</p>	<p>Reinforces prior learning from GCSE on structure of the nervous, endocrine and reproductive systems, extending knowledge of how changes are brought about nervously and the functions of different hormones within homeostasis.</p> <p>Unit 9 – Human Regulation</p> <p>Understand the interrelationship and nervous control of the cardiovascular and respiratory systems</p> <ul style="list-style-type: none"> Nervous system organisation Cardiovascular and respiratory

		<p>B3 Tissues structure and function</p> <ul style="list-style-type: none"> • Epithelial cells – squamous and columnar, including effect COPD • Endothelial cells including the effects of atherosclerosis • Muscle tissue – sliding filament theory • Fast twitch vs slow twitch • Nervous tissue – including different neurones, action potential, Control of heartbeat, ECGs, Synapses and role of neurotransmitters, and cause and treatment of Parkinsons disease and depression. <p>Unit 1 Physics: Waves in Communication</p> <p>C1 Working with Waves</p> <ul style="list-style-type: none"> • Features of waves • Longitudinal and transverse waves • Diffraction gratings and their industrial applications • Stationary waves and musical instruments <p>C2 Waves in communication</p>	<ul style="list-style-type: none"> • A1 Developing a hypothesis for an investigation • A2 Selection of appropriate equipment, techniques and standard procedures • A3 Health and safety associated with the investigation • A4 Variables in the investigation • A5 Method for data collection and analysis <p>B Data collection, processing and analysis/interpretation</p> <ul style="list-style-type: none"> • B1 Collection of quantitative/ qualitative data • B2 Processing data <p>C Drawing conclusions and evaluation</p> <ul style="list-style-type: none"> • C1 Interpretation/analysis of data • C2 Evaluation <p>These skills are developed through five themes: the skills are taught and</p>	<p>system regulation and control</p> <p>Understand the homeostatic mechanisms used by the human body</p> <ul style="list-style-type: none"> • Feedback and control • Glands and organs • Homeostatic mechanisms • Impact of an imbalance <p>Understand the role of hormones in the regulation and control of the reproductive system</p> <ul style="list-style-type: none"> • Structure and function of reproductive anatomy • Reproductive processes
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Skills- What will be developed?	Word and symbol equations Data interpretation Understanding of atomic/molecular models Manual dexterity associated with manipulation of practical equipment	Mathematical manipulation of equations Graphical interpretation Research	All skills associated with practice of the scientific method, as itemised above.	Data interpretation and literature research
Key 'How'/'Why' Questions- What powerful knowledge will be gained? What areas/themes/concepts will be explored?	How does atomic structure underpin the reactivity of elements and the production of useful compounds? Increased visualisation of the 3D atomic world	Emphasis on secure grasp of first concepts in order to apply use of scientific principles in everyday life.	Themes include Plants in their environment, Fuels, Diffusion, Enzymes, Electricity	Principles of homeostasis through a negative feedback loop within the different unit contexts.
SEND- how will support be seen? Seating plans? Simplified questions?	Keyword box for each lesson, glossary pages for each unit, knowledge organisers in booklet, scaffolded tasks.	All materials are produced in booklets. These clearly display all syllabus content in bitesize chunks and attempt to develop the learning logically. Booklets also contain glossary pages, additional questions etc for practice. Every lesson begins with recall of previous content.	Booklets lay out the fundamentals of what will happen in lessons. Syllabus included. Checklist of skills to be developed and assessed also itemised and reviewed within in each theme.	Scaffolded tasks within booklet to assist with the assignment brief outcomes. A pupil help PPT to guide through the assignment brief outcomes. Consolidation and further reading links within lesson PPTs.
Assessment- What? Why? Progress checks are formative (F) and assessments are summative (S)	Mini asst 1 (structure & bonding) F Half term asst S Learning aim B first submission (F) Learning Aim B resubmission (S) Learning Aim C first submission (F) Mini asst 2 (moles) (F) Mock exam (S) Learning aim A first submission (F) Learning aim C resubmission (S) Mini asst (periodicity) (F) Learning aim A resubmission (S) Mock exam (S)	Each section of the content is assessed using test papers (F) comprised of previous exam paper questions and assessed using exam board mark schemes. There are 11 tests in total, as well as Mock exams in January and Final exams (40 minutes each) in June year 12 in each of chemistry, physics and biology (S)	Each theme is assessed by a past paper, marked using an exam board mark scheme to give realistic grades throughout (F) -there are 5 in total. Summative assessment happens in May with a final exam. This includes	Written assignments for each learning aim, A B and C. There are internally assessed and verified and constitute one third of the available

	<p>External exam (S) Learning Aim D first submission (F) Learning Aim D resubmission (S) Unit 1 External exam makes up 50% of year 12 attainment Unit 2 (internally assessed and externally verified) makes up 50 % of year 12 attainment</p>		<p>40 minutes of reading time, where pupils are given an experimental procedure, with results, based around one theme. They then have a 2 hour paper in which to complete the analysis, conclusion and evaluation of the aforementioned experiment. This constitutes two thirds of the available assessment in year 13.</p>	<p>assessment in year 13.</p>
<p>What memory for learning skills will be required- modelling? Concrete answers? Retrieval?</p>	<p>Retrieval quizzes throughout starters, model answers within PPTs, progress checks.</p>	<p>Retrieval quizzes throughout starters, model answers within PPTs, progress checks.</p>	<p>Retrieval quizzes throughout starters, model answers within PPTs, progress checks.</p>	<p>Model answers within PPTs and pupil help PPT to guide through the assignment briefs.</p>
<p>Literacy- reading, extended accurate writing and oracy opportunities</p>	<ul style="list-style-type: none"> Written reports for learning aims 	<p>Main opportunities are through research activities for example on specialised cells, structure and function, and on regions of the Electromagnetic spectrum and their uses.</p>	<p>Mainly focussed on scientific writing with extensive emphasis on accurate useage of specific vocabulary.</p>	<p>Extended writing for each learning aim assignment.</p>
<p>Numeracy/comp uting skills</p>	<p>Data interpretation (ionisation energies and periodic properties) Calculations (moles)</p>	<p>Manipulation and use of equations to do with Magnification, wave speed, inverse square law, critical angles for example. Extensive use of standard form Graph drawing</p>	<p>Statistical methods including Standard deviation, CHI squared test and Students' t-test Graph plotting concluding and evaluation Data interpretation</p>	<p>Data interpretation Graph concluding</p>
<p>Character development</p>	<p>Students demonstrate RESPECTFUL attitudes when working together on learning aims. They are able to reflect on this quality in Learning Aim D. Formative First submissions followed by resubmissions develop RESILIENCE.</p>	<p>Excellent levels of attendance and personal organisation required to maintain a good set of notes. Revision skills used throughout the year as prep for ongoing assessment and summative exams. Collaborative skills when completing practical work.</p>	<p>Ability to plan and strategize completion of numerous investigations, organise equipment, collaborate in collection of results and then scrutinise</p>	<p>Compassionate discussion around disorders within all units. Respectful discussion around gender identity within</p>

			findings with a view to improving any procedure and making it better.	reproductive unit. Resourceful researching and further reading around assignment briefs.
Equality/Diversity opportunities		Positive portrayal of underrepresented groups within the science arena. This qualification encourages lower achievers to maintain their science studies by accepting lesser grades (5)		discussion around gender identity within reproductive unit.
Homework/Independent learning	Satchel tasks set to support learning using question booklets, split tasks to support learning aim writing	Either independent practice activities to consolidate learning in class, or preparation of revision materials for regular assessments. (Satchel)	Considerable amounts of writing up completed science investigations, developing skills at every opportunity.	Research tasks within units on actions of hormones, impacts of disorders and potential treatments.
CIAG coverage/links	<p>Links to analyst and quality control careers as part of learning Aim A https://www.chemicals.co.uk/blog/what-is-titration-used-for-in-real-life</p> <p>Links to use of colorimetry as part of Learning Aim A https://www.ehow.co.uk/info_8692477_real-life-uses-colorimeter.html</p> <p>Links to use of cooling curves in metal manufacturing and melting point analysis in Learning Aim B (see below table for link)</p> <p>Links to industrial use of chromatography in learning Aim C (see links below attend of table)</p> <p>NHS health care roles such as cardiologist, ECG technician, diabetic nurse practitioners, midwifery are considered as part of learning aim D https://www.stepintohenhs.nhs.uk/careers</p> <p>Learning aim B links to CIAG: https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Physical_Methods_in_Chemistry_and_Nano_Science_(Barron)/02%3A_Physical_and_Thermal_Analysis/2.01%3A_Melting_Point_Analysis</p> <p>Link for CIAG Learning Aim C: https://www.peakscientific.com/discover/news/5-everyday-uses-for-chromatography/ https://www.chromtech.com/applications-of-chromatography#:~:text=Chromatography%20plays%20a%20vital%20role,most%20common%20uses%20of%20chromatography.</p>	<p>Individuals involved in</p> <ul style="list-style-type: none"> • Uses of microscopy. • Gram testing bacteria/ use of antibiotics. • Causes and treatment of bronchitis, asthma, COPD, emphysema, atherosclerosis, Parkinsons disease, depression, multiple sclerosis. • Provision and use of fibre optics in endoscopy, communications of all types. • Uses of EMS eg Xrays, radio waves, microwaves. <p>Unit 1 Biology https://www.stepintohenhs.nhs.uk/careers in particular use</p>	<p>Each theme has an applied aspect which makes the backdrop for the science investigations undertaken. Ultimately this unit is about being an effective research scientist; understanding critically what makes a good investigation with a view to improving the quality of the scientific procedure in any scientific context. For example</p> <ul style="list-style-type: none"> • Fuels are discussed in terms of their uses for different purposes, as well as the need to be able to 	NHS health care roles such as cardiologist, ECG technician, diabetic nurse practitioners, midwifery.

		<p>biomedical science (research, microscopes, testing antibiotics)</p> <p>nursing of all sorts (midwifery, adult nursing)</p> <p>paramedic (BP, ECG)</p> <p>Phlebotomist (blood)</p> <p>Mental health nurse (depressive illness)</p> <p>Neurologist (action potential, synapses)</p> <p>Unit 1 Physics</p> <p>https://www.careerpilot.org.uk/job-sectors/media/job-profile/broadcast-engineer</p>	<p>calculate the energy content of food, and the dangers of incomplete combustion is also explored.</p> <ul style="list-style-type: none"> Plants in their environment explores the importance of biodiversity and the methods for measuring by carrying out field work and analysing data from field work. 	
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