

Science Department: Curriculum Overview 2023-24

Curriculum Intent:

We aim that our curriculum allows every science student to develop a passion for learning and engagement in science lessons through practical based learning and problem-solving approaches. The curriculum will build from the skills and knowledge that students develop in key stage 2, having carefully considered students starting point to enable a smooth transition to secondary science. Then through their 5-to-7-year journey, it allows students to gradually build both skills and knowledge through the spiral curriculum that revisits key content and skills on a cyclic basis so that all students continue to progress and master concepts. The aim will be to tailor each student's journey to allow every student to access the curriculum and all pupils to truly excel in their future science qualifications.

The curriculum will aim to equip students to use the scientific method and understand 21st century science in order to apply their knowledge to the wider world and everyday life as well as allowing them to fully evaluate real world scientific claims relevant to their own lives. To do this we will try to ensure the curriculum;

- Bases of science knowledge in the wider world and everyday life
- All lessons focus on the development of practical skills and problem-solving approaches.
- Equips students to use the scientific method in the real world to collect and interpret data for bettering their own lives, making decisions and evaluating scientific claims.
- Allows students to develop an understanding and awareness of the importance of following the health and safety regulations in everyday life and within a lab.
- Helps to develop students' language.

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Year 7	Term 1				Term 2			Term 3			End Points
	Intro	Term 1 Topic 1 Bio	Term 1 Topic 1 Phys	Term 1 Topic 1 Chem	Term 2 Topic 2 Bio	Term 2 Topic 1 Phys	Term 2 Topic 2 Chem	Term 3 Topic 3 Bio	Term 3 Topic 1 Phys	Term 3 Topic 3 Chem	
Topic		Cells	Forces	Matter	Ecosystems	Electricity	Simple chemical reactions	Reproduction	Energy	Earth and Space	
Skill		Biological drawings Preparing a sample	Planning a practical		Construct and interpret food chains/ webs	Constructing circuits safely and competently	Writing balanced chemical equations				
Content		Animal and Plant Cells Bacteria & Specialised Cell Microscopes Biological Drawing Organs and Organ Systems Skeleton/Muscle/Joints	Contact/Non Contact Forces Understanding speed, distance and time Understanding & Comparing Journeys Mass and Weight Gravity	Particle Model Solids Liquids and Gases Changes in state Diffusion Separating techniques Chromatography	Food chains and webs Toxins in the Environment Importance of Insects Interdependence and Competition Plant Reproduction Seed dispersal Invertebrate Classification	Electric circuits and energy in circuits Current, Voltage and Measuring Circuits Resistance Series Circuits Parallel Circuits Static Charge Safety and Control	Metals and Non Metals Displacement Reaction Oxidation Metals and Acids Acids and Alkalis Indicators Neutralisation	Types of reproduction Reproductive systems Gametes and fertilisation Puberty and Menstrual cycle Pregnancy and birth Variation causes and importance Contraception	Energy transfers and fuel Energy Transfers Potential, elastic kinetic energy Rates of energy-Power and cost Rates of energy-Power and cost Energy and temperature Simple machines Renewable and non renewable	Igneous Rocks Sedimentary Rocks Metamorphic rock The Rock Cycle The Earth & Moon Solar System Seasons	
Prior Knowledge Required											
Feedback Points											
Key Questions		What is the fundamental unit of living organisms? How can we observe, interpret and record cell structure using a light microscope What are the functions of the cell wall, cell	What is speed? Describe the quantitative relationship between average speed, distance and time	Explain the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure	Highlight the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops Explain the importance of	How is electric current measured Describe and draw series and parallel circuits What is potential difference,	How can we represent chemical reactions using formulae and using equations Explain oxidation and displacement reactions	Explain reproduction in humans (as an example of a mammal), including the structure and function of the male and female	What is energy Compare energy values and power ratings of appliances in watts (W, kW) Compare amounts of energy	Identify the composition and structure of the Earth Explain the rock cycle and the formation of igneous, sedimentary and	

		<p>membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</p> <p>Identify the similarities and differences between plant and animal cells</p> <p>Explain the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</p> <p>What is the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</p> <p>Describe the function of muscles and examples of antagonistic muscles.</p>	<p>Show how a journey can be represented on a distance-time graph</p> <p>What is relative motion.</p> <p>What type of forces are exerted between objects- using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces</p> <p>What are contact and non-contact forces.</p> <p>What forces are acting at a distance on Earth and in space,</p> <p>State the forces between magnets</p> <p>What is static electricity?</p>	<p>Describe changes of state in terms of the particle model.</p> <p>Identify the concept of a pure substance mixtures, including dissolving</p> <p>Explain diffusion in terms of the particle model</p> <p>Describe simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances</p>	<p>plant reproduction through insect pollination in human food security</p> <p>Show how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</p>	<p>What is resistance and how can it be measure</p> <p>Explain the idea of static charge</p>	<p>Define acids and alkalis in terms of neutralisation reactions</p> <p>What is the pH scale and why do we use it</p> <p>Explain indicators and its use in neutralisation</p> <p>What do reactions of acids with metals produce</p> <p>Explain how reactions of acids with alkalis produce a salt plus water</p> <p>Identify and explain displacement reactions</p>	<p>reproductive systems</p> <p>Describe the menstrual cycle, gametes, fertilisation, gestation and birth</p> <p>Identify the effect of maternal lifestyle on the foetus through the placenta</p> <p>Explain reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal</p>	<p>transferred (J, kJ, kW hour)</p> <p>How can energy be quantified and calculated</p> <p>What are different types of fuels and energy resources.</p> <p>What is a simple machine</p>	<p>metamorphic rocks</p> <p>Evaluate the Earth as a resource</p> <p>Explain the seasons, day and night and the Earth’s tilt at different times of year, in different hemispheres</p> <p>What is a light year</p>	
Direct Vocab Instruction		<p>Organelles</p> <p>Cells</p> <p>Specialised cells</p> <p>Sub-cellular</p> <p>Microscope</p> <p>Magnification</p>	<p>Motion</p>								

		Specimen Organ Resolution									
Standardised Homework	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	

Year 8				Term 2			Term 3			End Points
	Term 1 Topic 1 Bio	Term 1 Topic 1 Phys	Term 1 Topic 1 Chem	Term 2 Topic 2 Bio	Term 2 Topic 1 Phys	Term 2 Topic 2 Chem	Term 3 Topic 3 Bio	Term 3 Topic 1 Phys	Term 3 Topic 3 Chem	
Topic	Human Body	Forces 2	Periodic Table	Bioenergetics	Magnetism	Advanced Chemical Reactions	Genetics	Waves	Earth and Atmosphere	
Skill			Using periodic table			Using periodic table Writing balanced chemical equations	Producing punnet squares Interpreting pedigree diagrams			
Content	Breathing (Lungs and measuring breathing) Gas exchange and the effects of disease on gas exchange Healthy lifestyle and the effects of drugs Healthy Eating Digestive system and organs Enzymes	Equilibrium Drag Stretch and compression Pressure in solids and calculations Pressure in liquids Sinking and Floating	Atomic model Electronic configuration Exploring metals Exploring non-metals Elements and combining elements Compounds and mixtures Polymers Ceramics and composites	Aerobic and Anaerobic respiration Anaerobic respiration in sport and fermentation Photosynthesis-testing photosynthesis Parts of a leaf-iodine test Gas exchange in plants Movement and importance of minerals	Forces Fields Gravity and orbits Magnetism Uses of Electromagnets Investigating the strength of electromagnets	Exothermic reactions Endothermic reactions Investigation Catalysts Combustion Thermal decomposition Law of conservation	Genetic material and chromosomes Variation Modelling variation Human genome and genetic disorders Natural selection Biodiversity Extinction	Transverse and longitudinal waves. Properties of waves Exploring sound Detecting sound Exploring light Detecting light and colour Reflection and refraction	Understanding the atmosphere Carbon Cycle Water Cycle Global warming Extracting metals Human impact Recycling and sustainability	
Prior Knowledge Required										
Feedback Points										
Key Questions	What are the contents of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water,	Explain the forces associated with deforming objects How is force measure Explain Hooke's Law Describe work done and energy	State the varying physical and chemical properties of different elements Describe the principles underpinning the Mendeleev Periodic Table	Explain aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life	What are magnetic poles, attraction and repulsion Identify magnetic fields by plotting with compass, representation by field lines Describe the Earth's magnetism,	Identify and explain exothermic and endothermic chemical reactions (qualitative). What is combustion and thermal decomposition	What is the process by which genetic information is transmitted from one generation to the next What is the part played by Watson, Crick, Wilkins and Franklin in the	What are waves Describe the properties of waves What are longitudinal and transverse waves Explain the similarities and differences between light	Are resources on Earth limited? Explain the carbon and water cycle What is the composition of the atmosphere How do humans impact the climate	

	<p>Why each is needed?</p> <p>What are the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</p> <p>Identify and describe the tissues and organs of the human digestive system, including adaptations to function</p> <p>Explain how the digestive system digests food (enzymes simply as biological catalysts)</p> <p>State the importance of bacteria in the human digestive system</p> <p>Identify the structure and functions of the gas exchange system in humans, including adaptations to function</p> <p>What is the mechanism of breathing- including simple measurements of lung volume</p> <p>Explain the impact of exercise, asthma and smoking on</p>	<p>changes on deformation</p> <p>What is the relationship between atmospheric pressure with height and weight</p> <p>Explain pressure in liquids and how it is measured</p>	<p>Summarise the Periodic Table: periods and groups; metals and non-metals</p> <p>Explain how patterns in reactions can be predicted with reference to the Periodic Table</p> <p>Describe the properties of metals and non-metals</p> <p>Explain the chemical properties of metal and non-metal oxides with respect to acidity.</p> <p>State the order of metals and carbon in the reactivity series</p> <p>Identify the use of carbon in obtaining metals from metal oxides</p> <p>Explain the properties of ceramics, polymers and composites (qualitative).</p>	<p>Write a word summary for aerobic respiration</p> <p>Explain the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration</p> <p>Identify the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.</p> <p>Explain the idea of plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.</p> <p>Identify and explain the role of leaf stomata in gas exchange in plants.</p> <p>Write the word summary for photosynthesis</p> <p>Explain the adaptations of leaves for photosynthesis.</p>	<p>compass and navigation</p> <p>Explain the magnetic effect of a current, electromagnets, D.C. motors (principles only).</p>	<p>Explain the idea of conservation of mass</p> <p>What catalysts do</p>	<p>development of the DNA model</p> <p>Explain differences between species</p> <p>Describe the variation between individuals within a species being continuous or discontinuous- include measurement and graphical representation of variation</p> <p>What is competition</p> <p>Explain how changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction</p> <p>State the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</p>	<p>waves and waves in matter</p> <p>Describe the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</p> <p>Model the use of ray boxes to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing</p>	<p>What can we do to help save the planet</p>	
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	the human gas exchange system									
Direct Vocab Instruction										
Standardised Homework	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	Multiple choice quizzes SAM Learning/Seneca Exam style question	

Year 9	Term 1		Term 2		Term 3		End Points
	Term 1 [Physics lessons]	Term 1 [Chemistry lessons]	Term 2 [Physics lessons]	Term 2 [Biology lessons]	Term 3 [Biology lessons]	Term 3 [Chemistry lessons]	
Topic	Energy & Matter	Topic 1 Atomic Structure and Periodic Table	Atomic structure and Electricity	Cells	Bioenergetics	Topic 2 Structure & Bonding	
Skill	<ul style="list-style-type: none"> - Rearranging equations - Applying equations - Conduct core practical safely and competently. 	<ul style="list-style-type: none"> - Using periodic table - Writing balanced chemical equations - Explaining reactions in terms of electron structure 	<ul style="list-style-type: none"> Re-arrange equations Apply equations to different contexts Using standard form Construct circuits safely and competently 			<ul style="list-style-type: none"> - Working out structure of ions and practice drawing these - Practical skills - Planning and writing a step-by-step method for a preparing a pure, dry sample of a salt - Recording results in an appropriate form - Analysing given data 	
Content	<ul style="list-style-type: none"> - Potential and kinetic energy - Work done and power - Efficiency and dissipation - Density and changes of state - Internal energy - Specific heat capacity & Latent heat 	<ul style="list-style-type: none"> - Atomic structure & history of the atom - Relative atomic mass, atomic number, isotopes & electron configuration - Periodic table structure & development of the periodic table - Group 1 alkali metals - Group 7 halogens & their reactions - Group 0 and summary of reactions link to periodic table - Balancing equations and states of matter - Separating techniques 	<ul style="list-style-type: none"> Charge, current and voltage Series and Parallel circuits Resistance Structure of the Atom Rutherford's experiment ===== Radioactive decay Nuclear equations introduction to half-life 	<ul style="list-style-type: none"> - Cell Types/ Cell Ultrastructure -DNA/ Chromosomes /Mitosis /Cell Division - Stem Cells - Cell Differentiation/ Cell Specialisation - Microscopes Intro/ Bio-viewers/ Calculations -Cellular Transport (Diffusion/ Osmosis/ Active Transport) - RP: Osmosis 	<ul style="list-style-type: none"> - Recap of Prior Knowledge/ Equation/ Starch Testing Practical - Rate of reaction/ RP 5 – Light Intensity/ Demo & Carry out - Experimental review/ Limiting factors -Feedback Task: replanning rate Exp for different factors - Uses of glucose -Aerobic and anaerobic respiration -Planning Anaerobic practical with Yeast – link to feedback task in 4.4 - Response to exercise and metabolism 	<ul style="list-style-type: none"> - Introduction to types of bonding – what happens in terms of electrons and why? - Ionic bonding & properties of ionic compounds - Covalent bonding in simple molecules & giant structures and their properties - Allotropes of carbon, graphene & fullerene - Metallic bonding including alloys - Smart materials to include nanoparticles and polymers 	

Prior Knowledge Required	<ul style="list-style-type: none"> - Solids liquids and gasses - 	<ul style="list-style-type: none"> - All matter is made up of atoms - Metals & non-metals in the periodic table 	All matter is made up of atoms. Atoms contain electrons that can move through a circuit	<ul style="list-style-type: none"> - What are organelles within a cell structure? 	<ul style="list-style-type: none"> - What is photosynthesis? - What is respiration? - Gas exchange 	- Atoms, elements, compounds, mixtures	
Feedback Points			?				
Key Questions	<ul style="list-style-type: none"> - What is the conservation of energy/matter? - How do I calculate the efficiency of an appliance? - How can I make my home more insulated? - How do I calculate work done/power? - What is energy? What is an energy transfer? - What is/how to calculate density? - How can we describe changes of state? - What is internal energy? - What is specific heat capacity/latent heat and how can we calculate it? - How can we explain gas pressure using the particle model? 	<ul style="list-style-type: none"> - What is the conservation of mass? - Properties of alkali metals - Properties of halogens - Properties of noble gases - How are the properties of groups in the periodic table explained by electronic structure? 	What is charge, current and voltage? How does current and voltage change in series and parallel circuits? Which equations would we use to calculate current and voltage in a circuit? What is resistance? How do we calculate resistance? What are atoms made of? How do scientists use models? Why do we need to know about different types of radiation?	Compare and contrast the sub-cellular structure of an animal and a plant cell. Explain the difference between a prokaryotic and eukaryotic cell. Explain how the structure of different types of cell relate to their function. Calculate the magnification of a specimen viewed under the microscope. State the three stages of the cell cycle. Explain the importance of mitosis in growth and development. Discuss the social and ethical issues in the use of stems cells. Describe how substances are transported into and out of cells by diffusion, osmosis, and active transport.	Describe the process of photosynthesis. State the importance of the chloroplast, stomata and guard cells. Explain the effects of limiting factors on photosynthesis. Explain the uses of glucose from photosynthesis. Describe the process of respiration and where it takes place. Contrast and compare aerobic and anaerobic respiration. Explain the effects of exercise on the body, referring to oxygen debt. Explain the importance of nutrients and how they are broken down into simpler molecules. Define metabolism and state an example.	-Why do atoms transfer or share electrons? - How does bonding effect properties? - What are allotropes?	
Direct Vocab Instruction	<ul style="list-style-type: none"> - System - Transfer - Dissipate & efficiency; radiation, conduction, convection - Energy names - Potential - Store - Power/work - Renewable - Density - Changes of state - Particle, particle model - Conservation of mass/energy - Capacity - latent 	<ul style="list-style-type: none"> -Proton -Neutron -Electron -Isotopes -Elements -Compounds -Mixtures -Alkaline metals -Halogens -Nobel gases -Displacement -Reactivity - Solid, liquid and gas 	<ul style="list-style-type: none"> - Charge - Current - Voltage - Describe - Explain - Calculate - Half-life - Decay - Model 	<ul style="list-style-type: none"> - Organelles - Cells - Specialised cells - Stem cells - Sub-cellular - Microscope - Magnification - Specimen - Mitosis - Diffusion - Osmosis - Active transport 		<ul style="list-style-type: none"> - Ionic, covalent, metallic bonding - Intermolecular forces - Allotropes - Alloys - Delocalised electrons - Ions - Polymers - Polymerisation - Nanoparticles 	

Standardised Homework	<ul style="list-style-type: none">- multiple choice quiz on Show My Homework- explain a concept to a family member/friend- take away a question and complete	<ul style="list-style-type: none">- Exam question- Multiple choice quiz- Research task	Write a paragraph explaining why alpha, beta and gamma have different risks to our health in different situations.	SAM Learning Exam Questions Quizzes through MS Forms Complete a worksheet Practical Writeups Draw a graph	SAM Learning Exam Questions Quizzes through MS Forms Complete a worksheet Practical Writeups Draw a graph	<ul style="list-style-type: none">- Exam question- Multiple choice quiz	
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Year 10 Physics	Term 1		Term 2		Term 3		End Points
	Half Term 1 [6 lessons]	Half Term 2 [6 lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Mains electricity	Radiation	Waves	Waves	Forces	Forces	
Skill	Explain the relevant uses and dangers of mains electricity Describe how different domestic appliances transfer energy Explain why the National Grid system is an efficient way to transfer energy.	Graphing Half-life Apply equations to different contexts, Converting units where appropriate	Recall wave properties Explain the difference between longitudinal and transverse waves Explain how each electromagnetic wave is suited to its practical application Core Practical- using a ripple tank to determine the speed of a wave	Recall that the range of normal human hearing is from 20 Hz to 20 kHz. Explain how the study of seismic waves provided new evidence that led to discoveries about parts of the Earth which are not directly observable Core Practical - investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.			
Content	IV characteristics DC/AC current Three pin plugs National grid Power in circuits Electric fields and static charge***	Half life Medical uses (triple) Fission and fusion (triple)	Transverse and Longitudinal Measuring Wave Speeds Reflection and Refraction The EM Spectrum Colour ----- Lenses, Images, Ray Diagrams	Sound Waves Ultrasound Seismic Waves Black-Body Radiation ----- Temperature of the Earth	Vectors and Scalars Forces and Weight Resultant Forces Speed/Velocity Acceleration	D-t and V-t Graphs Calculations of Motion Moments Levers and Gears	
Prior Knowledge Required	Charge, Current, Voltage, Energy and Power	Structure of the atom Nuclear decay	Light travels in straight lines White light is made up of many colours	Properties of waves The difference between sound and light waves			
Feedback Points							
Key Questions	How do I graph data? How do I determine the I-V characteristics of a component? What is the difference between AC and DC? How does the national grid work? How do we calculate/measure energy and power in electrical circuits?	How can I infer the half-life of a substance from a graph? What are the uses of radiation in medicine? What are the uses of fission and fusion in providing electricity?	What is meant by a wave property? How can you determine different properties of waves? Explain how a ripple tank can be used to determine the speed of a wave?	What is the normal range of human hearing? How do scientists know the structure of the inside of the Earth when they can't see inside it? Does the colour or texture of a surface affect the rate at which it absorbs heat energy?			
Direct Vocab Instruction	Alternating Characteristic Compare	Fusion Fission Determine Explain	transverse longitudinal Oscillate Parallel perpendicular	Determine Explain Compare			
Standardised Homework							

Year 10 Chemistry	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Topic 5 Energy Changes and Topic 6 Rates of reaction	Topic 4 Chemical Changes Metal and acids (Part 1)	Topic 4 Chemical Changes Electrolysis (Part 2)	Topic 3 Quantitative chemistry	Topic 7 Organics	Topic 9 Atmosphere	
Skill	<ul style="list-style-type: none"> - Graph interpretation – using the slope of a tangent as a measure of rate of change - Maths skills – recognise and use expressions in decimal form - Practical skills 	<ul style="list-style-type: none"> - Writing balanced chemical equations - Practical skills - Planning and writing a step-by-step method for a preparing a pure, dry sample of a salt - Recording results in an appropriate form - Analysing given data 	<ul style="list-style-type: none"> - Writing balanced chemical equations - Practical skills – planning, recording and analysing given data 	<ul style="list-style-type: none"> - Balancing equations - Maths skills to include: Manipulation of equations to calculate an unknown entity. Conversion from decimals to standard form - Practical skills, carrying out an accurate titration to calculate an unknown concentration (separates) 	<ul style="list-style-type: none"> - Practical skills - Use Molymods to make 3D models of organic compounds 	<ul style="list-style-type: none"> - Maths skills – using ratios, fractions and percentages - Analysing given data 	
Content	<p>Topic 5</p> <ul style="list-style-type: none"> - Exothermic and endothermic reactions to include reaction profiles - Energy changes core practical - Bond energy calculations (higher only) <p>Separate content</p> <ul style="list-style-type: none"> - Fuel cells and batteries <p>Topic 6</p> <ul style="list-style-type: none"> - Factors affecting rates & collision theory and calculating rate - Effect of concentration practical & rate calculation - Effect of temperature practical & rate calculation - Effect of surface area practical & rate calculation - Catalysts and activation energy 	<p>Topic 6 contd</p> <ul style="list-style-type: none"> - Equilibria and Le Chatelier's Principle <p>Topic 4 (part 1)</p> <ul style="list-style-type: none"> - Metals & metal oxides and redox, - Reactivity series and extraction of metals - Acids, alkalis, neutral solutions, pH scale and indicators - Metals & acids, neutralisation of acids, strong and weak acids - Making a salt core practical 	<p>Topic 4 (part 2)</p> <ul style="list-style-type: none"> - Review of ions, ionic bonding, and ionic compounds - Review balancing equations - Electrolysis of molten compounds & solutions - Extraction of metals from their ores e.g. aluminium from bauxite, half equations - Electrolysis core practical 	<ul style="list-style-type: none"> - Conservation of mass - Relative formula mass - Moles - Calculating amounts of substances - Using moles to balance equations - Concentrations of solutions <p>Separate content</p> <ul style="list-style-type: none"> - Percentage yield & Atom economy - Using moles, volumes and concentration of solutions in a calculation - Titrations - Volumes of gases 	<ul style="list-style-type: none"> - Crude oil & alkanes - Fractional distillation & properties of hydrocarbons - Combustion - Cracking & alkenes <p>Separate content</p> <ul style="list-style-type: none"> - Alkenes - Alcohols - Carboxylic acids - Polymerisation - Amino acids & DNA 	<ul style="list-style-type: none"> - Evolution of the atmosphere from early to current - Greenhouse gases & human activities - Carbon footprint and it's reduction - Atmospheric pollutants from fuels and their properties and effects 	
Prior Knowledge Required	<ul style="list-style-type: none"> - Exothermic and endothermic reactions - Catalysts 	<ul style="list-style-type: none"> - Acids, alkalis & neutralisation - pH scale - Metals & acids - Displacement reactions and reactivity of metals 	<ul style="list-style-type: none"> - Writing word equations to explain a chemical reaction - How are ions formed? 	Mass number of an element	- Covalent bonding	<ul style="list-style-type: none"> - Early and current atmosphere - Combustion of fuels - Human activities and their effects 	
Feedback Points							
Key Questions	<ul style="list-style-type: none"> - What happens to energy during a reaction? - How can I tell whether a reaction is exothermic or endothermic? 	<ul style="list-style-type: none"> - What is Le Chatelier's Principle and can I use it to predict the effect on position of equilibrium with different conditions. 	<ul style="list-style-type: none"> - What happens to ions at the anode and cathode when an ionic compound is electrolysed? - Can I write a balanced half equation? 	<ul style="list-style-type: none"> - What is meant by the conservation of mass in a chemical reaction? - How can I work out the relative formula mass of a compound? 	<ul style="list-style-type: none"> - How is crude oil formed? - What is meant by the term homologous series in organic chemistry? - What is an alkane? 	<ul style="list-style-type: none"> - How did the current atmosphere evolve from the early atmosphere? - What is the greenhouse effect? 	

	<ul style="list-style-type: none"> - What does rate of reaction mean? - What factors affect the rate of a chemical reaction? - What is collision theory? - What do we mean by equilibrium? 	<ul style="list-style-type: none"> - Can I work out the position of the metals in the reactivity series given the results of a series of reactions? - Why are there different methods of extracting metals from metal ores? - What is a redox reaction in terms of loss or gain of oxygen? - Can I work out the name of the salt formed in a reaction from the named acid? - What is an indicator? - What does the pH scale measure? - How are strong and weak acids different? 	<ul style="list-style-type: none"> - What does preferential discharge mean and how is it related to the reactivity series? 	<ul style="list-style-type: none"> - Can I explain concentration in terms of particles? - What is a mole? - Can I use reacting ratios to write a balanced equation? - Calculating concentrations of solutions using the formula triangle <p>Separate content</p> <ul style="list-style-type: none"> - Why are percentage yield and atom economy important in an industrial process? - Can I calculate the unknown concentration of a solution using a titration? - Can I use the gas equation to calculate moles and volumes of gases? 	<ul style="list-style-type: none"> - What is fractional distillation and the products from crude oil? - What are the products of combustion of fuels? - Can I explain the difference between a double and single bond in terms of covalent bonding - How can I use bromine water to work out whether my hydrocarbon is an alkane or alkene? - How has cracking helped meet the supply and demand issue for fuels? <p>Separate content</p> <ul style="list-style-type: none"> - Do I know the equation for the fermentation of sugar to make ethanol? - Can I predict what salt is going to form from the reaction of a given carboxylic acid? - Can I write equations to show the formation of a polymer from a given monomer - Can I recognise the monomer used to form a given polymer? - How is condensation similar yet different to addition polymerisation? - Be able to explain how amino acids react to form proteins - Recognise the fact that naturally occurring polymers are essential for life – for example DNA 	<ul style="list-style-type: none"> - How have human activities affected the atmosphere? - How do greenhouse gases trap the radiation from the sun and how does this affect the global climate? - What is meant by the carbon footprint and how can we reduce this? - How do atmospheric pollutants from fuels affect the atmosphere? 	
Direct Vocab Instruction	<ul style="list-style-type: none"> - Exothermic - Endothermic - Rate of reaction - Collision theory - Concentration - Temperature - Surface area - Catalyst - Equilibrium 	<ul style="list-style-type: none"> - Reactivity - Metal oxide - Reduction - Oxidation - Strong and weak acid - Hydrogen ion concentration - Indicators - Neutralisation 	<ul style="list-style-type: none"> - Electrolysis - Cathode - Anode - Cation - Anion - Electrolyte - Molten - Solution - Half equations 	<ul style="list-style-type: none"> - Conservation of mass - Relative molecular mass - Concentration - Mole - Titration - Molar gas volume 	<ul style="list-style-type: none"> - Homologous - Alkane - Alkene - Fractional distillation - Cracking - Viscosity - Combustion - Fermentation - Polymerisation - Monomer - Polymer - Addition polymerisation - Condensation polymerisation - Amino acid - Polypeptide - Protein 	<ul style="list-style-type: none"> - Atmosphere - Radiation - Ultraviolet - Infrared - Greenhouse gas - Pollutant - Global warming 	
Standardised Homework	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz 	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz 	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz 	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz 	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz - Research task 	<ul style="list-style-type: none"> - Exam question - Multiple choice quiz 	

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Year 10 Biology	Term 1		Term 2		Term 3		End Points
	Half Term 1 [7 lessons]	Half Term 2 [8 lessons]	Half Term 3 [6 lessons]	Half Term 4 [6 lessons]	Half Term 5 [6 lessons]	Half Term 6 [7 lessons]	
Topic	Unit 3: Infection and Response (8)		Unit 4: Bioenergetics (8)		Unit 7: Ecology (13)		
Skill	Graph Interpretation Aseptic Technique		Experimental Planning Graphical Interpretation		Graphical Interpretation Experimental Planning Data Analysis		
Content	What is communicable disease How are diseases transmitted Types of Pathogen Examples of disease Malaria Life Cycle & Prevention Primary Defence Systems Secondary Defence Systems Drug Development Vaccines Monoclonal Antibodies* Plant Disease/Responses* RP: Culturing Microorganisms *		What is photosynthesis? What are the equations (word and balanced chemical) Factors affecting Measuring Rate Uses of glucose Aerobic and anaerobic respiration Word/Balanced Chemical equations Fermentation in Yeast Effect of Exercise and Metabolism		Food chains and webs Interdependence Pyramids of Numbers and Biomass* Cycles (Water and Carbon) Decay and Decomposition* Biodiversity Environmental Factors Adaptations Sampling the environment Land Use Global Warming Food Security and Farming*		
Prior Knowledge Required	Cell Types		Cell structure, KS3 respiration, Heart and Lungs structure/function		Food Chain and Webs Global Warming		
Feedback Points			Experimental planning tasks				
Key Questions	How do we get sick What makes us sick? What diseases can we catch? What is Malaria? How does our body protect us and make us better? How we develop new treatments? How does a vaccine work? How do plants respond to disease? What is a monoclonal antibody and how can it be used?		What is photosynthesis? Where does it happen? What affects the rate of photosynthesis? What are limiting factors What does a plant do with glucose? What is the differences between aerobic and anaerobic respiration? What is fermentation? How does our body respond to exercise and why?		How do animals and plants interact with their environment? What factors affect organisms? Hoe does energy move through an ecosystem? How are organisms adapted to their environment? What is global warming? How is land used?		
Direct Vocab Instruction	Keywords		Keywords		Keywords		
Standardised Homework	Quizzes on forms SAM Learning/Seneca		Quizzes on forms Practical write ups on OneNote SAM Learning/Seneca		Quizzes on forms Practical write ups on OneNote SAM Learning/Seneca		

Year 11 Physics	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Forces	Electromagnetism	Astrophysics	Unifying Concepts 1	Unifying concepts 2	Exams	
Skill	Interpret data from a practical investigation Apply Newton's laws	Draw magnetic fields Apply equations	Use observations to arrive at theories	Apply different parts of the specification to solve contextual problems.	Apply different parts of the specification to solve contextual problems		
Content	Forces on Springs Stopping Distances Newton's Third Law Momentum Conservation of Momentum Collisions	Permanent and induced magnetism, forces and fields The Motor Effect Loudspeakers and microphones Generators and transformers	The Solar System Life Cycles of Stars Orbits of Planets, Moons and Satellites Red-Shift	Energy with Electricity Electricity with Electromagnetism Nuclear with Waves	Matter with Energy Forces with Electricity Matter with Electricity		
Prior Knowledge Required	Contact and non-contact forces Speed, distance, time Acceleration	Poles of a magnet Magnetic materials	The Earth rotates on its own axis and orbits the Sun.	Energy, electricity, matter, atomic structure, forces, waves and magnetism	Energy, electricity, matter, atomic structure, forces, waves and magnetism		
Feedback Points							
Key Questions	Describe the difference between a linear and non-linear relationship between force and extension Explain a method for determining human reaction time Explain the dangers caused by large decelerations Describe factors affecting stopping distances ----- Explain the concept of conservation of momentum	Describe how the magnetic effect of a current can be demonstrated Draw the magnetic field pattern for a straight wire carrying a current and for a solenoid Use Fleming's left-hand rule to recall the factors that affect the size and direction of the force on a conductor. ----- Explain how a moving-coil loudspeaker and headphones work	Describe the similarities and distinctions between the planets, their moons, and artificial satellites. Explain the phenomenon that is red shift Explain how red shift provides evidence for the Big Bang model Describe the observations used by scientists to produce the Big Bang theory	Explain how the power of an immersion heater can be used to determine the specific heat capacity of a solid Explain the link between current in a wire and the motor effect. Compare the similarities and differences between different types of radiation with reference to charge.	Evaluate the advantages and disadvantages of different types of energy resources Describe the benefits and risks of using X-rays and Gamma rays to diagnose and treat cancers Use Newton's laws to explain why a boat propeller causes a boat to accelerate Explain how Fleming's left-hand rule is used to determine the direction of motion of a wire		
Direct Vocab Instruction	Determine Interpret Evaluate	Describe Determine Calculate	Observation Evidence Theory	State Identify Explain	Interpret Describe Evaluate		
Standardised Homework							

Year 11 Chemistry	Term 1		Term 2		Term 3		
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	

Topic	Topic 9 Chemical Analysis	Topic 10 Using resources	Recap key year 9 & 10 content – topics 1, 2 & 3	Recap key year 10 content – topics 4 & 6	Recap key year 10 content – topics 7 & 9	Exams	End Points
Skill	Maths skills – calculate retention factor values - Analysis of chromatograms - Plan and carry out a method to analyse an unknown compound	- Interpret data from a graph - Maths skills – translate information between graphical and numerical form - Practical skills	Recall key concepts and apply different parts of the specification to exam questions	Recall key concepts and apply different parts of the specification to exam questions	Recall key concepts and apply different parts of the specification to exam questions		
Content	- Purity & separation - Chromatography - Gas tests Separate content - Flame tests - Metal hydroxide tests - Test for anions - Use of chemical tests to identify ions in an unknown compound - Instrumental methods and spectroscopy	- Sustainable development - Potable water - Waste water treatment - Alternative methods of metal extraction - Life cycle assessments and recycling Separate content - Corrosion - Alloys as useful materials - Ceramics, polymers and composites - Haber process - Production and use of NPK fertilisers	Topic 1 - Structure of the Atom - Electron structure - Development of the periodic table Topic 2 - Types of bonding and their properties Topic 3 - Relative formula mass - Moles - Calculating amounts of substances - Using moles to balance equations - Concentrations of solutions Separate content - Using moles, volumes and concentration of solutions in a calculation - Titrations - Volumes of gases	Topic 4 - Electrolysis - Extraction of metals from their ores e.g., aluminium from bauxite - Half Equations Topic 6 - Factors affecting rates & collision theory - Investigating rates - Equilibria and Le Chatelier's Principle	Topic 7 - Crude oil & alkanes - Fractional distillation & properties of hydrocarbons - Combustion - Cracking & alkenes Separate content - Alkenes - Alcohols - Carboxylic acids - Polymerisation Topic 9 - Evolution of the atmosphere from early to current - Greenhouse gases & human activities - Atmospheric pollutants from fuels and their properties and effects		
Prior Knowledge Required	Practical techniques that can be used to separate mixtures	Sustainability and recycling of resources Bonding in metals					
Feedback Points							
Key Questions	- What is a pure substance? - How can we use different techniques to analyse unknown substances?	- What do we mean by sustainable resource? - What is a finite resource? - What is the difference between potable and pure water? - How can we treat waste water? - What alternative methods can we use to extract metals from low grade ores? - What factors affect corrosion of metals and why is this an issue? - Why is the Haber process essential for agriculture?					

		- Why led to the choice of certain conditions for the manufacture of ammonia? Why do fertilisers contain different amounts of nutrients?					
Direct Vocab Instruction	- Formulation - Chromatography - Spectroscopy - Chromatography - Mass spectrometer - Flame emission spectroscopy	- Sustainable - Finite - Potable - Phytomining - Bioleaching - Corrosion - Equilibrium					
Standardised Homework	- Exam question - Multiple choice quiz	- Exam question - Multiple choice quiz	- Exam question - Multiple choice quiz	- Exam question - Multiple choice quiz	- Exam question - Multiple choice quiz		

Year 11 Biology	Term 1		Term 2		Term 3		End Points
	Half Term 1 [10 lessons]	Half Term 2 [? lessons]	Half Term 3 [13 lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Inheritance and Evolution		Ecology				
Skill	Interpretation of genetic diagrams Data Analysis Graphical Interpretation		Graphical Interpretation Experimental Planning Data Analysis				
Content	Reproduction Sex determination Meiosis DNA & Human Genome Protein Synthesis* Variation Inherited Disorders Charles Darwin and Natural Selection Speciation and Lamarck* Classification Fossils and Extinction Selective Breeding Cloning/Genetic Engineering		Food chains and webs Interdependence Pyramids of Numbers and Biomass* Cycles (Water and Carbon) Decay and Decomposition* Biodiversity Environmental Factors Adaptations Sampling the environment Land Use Global Warming Food Security and Farming*				
Prior Knowledge Required	Mitosis DNA Classification		Food Chain and Webs Global Warming				

Feedback Points							
Key Questions	How do organisms reproduce? What does DNA do? How are sex cells made? What happens when DNA goes wrong? Why do we have so many different species? How do we know what came before? Why do species die out? How do we use genes to our advantage?		How do animals and plants interact with their environment? What factors affect organisms? How does energy move through an ecosystem? How are organisms adapted to their environment? What is global warming? How is land used?				
Direct Vocab Instruction							
Standardised Homework	Quizzes on forms Practical write ups on OneNote SAM Learning/Seneca Exam Questions		Quizzes on forms Practical write ups on OneNote SAM Learning/Seneca Exam Questions				

Year 12 Physics	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Forces 6	Electricity	Field Mechanics	Forces 7 & Nuclear and Particle physics	Nuclear and Particle physics	Matter	
Skill	Resolving forces/vectors Mathematical skills						
Content	Velocity and Acceleration Motion Graphs Adding Forces Moments Newton's Laws Kinematics Resolving Vectors Projectile Motion Gravitational and Kinetic Energies Work and Power Linear Momentum Conservation of Momentum	Electric Current Electrical Energy Transfer Current and Voltage Relationships Resistivity Conduction and Resistance Semiconductors Kirchoff's Laws Potential Dividers Emf and Internal Resistance Power in Circuits	Electric Fields Millikan and Coulomb Radial Electric Fields Coulomb's Law Capacitors Exponential Functions Magnetic Fields Electric Motors Magnetic Forces Generating Electricity/A.C.	<u>Forces 7:</u> 2-Dimensional collisions Further collisions Circular motion Proofs for circular motion Centripetal force and acceleration <u>Nuclear and Particle physics:</u> Nuclear radiation Rate of decay Fission and fusion Nuclear Power stations The Nuclear Atom	Particle accelerators Particle detectors The LHC The Particle Zoo Particle Interactions	Fluids Density and Upthrust Fluid Movement Drag Terminal Velocity Hooke's Law Stress, Strain The Young Modulus Stress-Strain Graphs	

Prior Knowledge Required							
Feedback Points							
Key Questions							
Direct Vocab Instruction							
Standardised Homework							

Year 12 Chemistry	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Topic 1 Atomic Structure Topic 2 Bonding and structure	Topic 5 Formulae, equations & amounts Topic 3 Redox reactions	Topic 4 Inorganic chemistry and the periodic table Topic 8 Chemical energetics	Topic 6 Organic chemistry I Topic 7 Modern Analytical Techniques I	Topic 9 Kinetics I Topic 10 Equilibrium I	Topic 11 Equilibrium II Topic 12 Acid-base equilibria	
Skill	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	
Content	Subatomic particles & the Periodic table Mass spectrometry Relative atomic mass and isotopes Electron configuration & orbital theory Ionisation energies Periodicity Ionic bonding Ionic structure Covalent bonding covalent structures Allotropes of carbon Metallic bonding & structure Intermolecular forces Shapes of molecules Polarity Solubility	Oxidation numbers Half equations Redox equations Amounts of substances Empirical and molecular formulae Ionic equations Reacting masses $pV=nRT$ Titration calculations Experimental Techniques Percentage yield Atom Economy	Group 2 properties & patterns Group 2 reactions Group 7 properties & patterns Group 7 reactions Ion tests Enthalpy changes & reaction profiles Standard enthalpies of combustion, neutralisation & formation $Q=MCT$ Hess's Law and Hess cycles Bond enthalpies	Homologous series & functional groups Nomenclature Isomerism Fuels & combustion Reactions of Alkanes Reactions of Alkenes Addition Polymerisation Halogenoalkanes Alcohols Mass Spectrometry Infrared spectroscopy Combustion analysis	Collision theory Calculating rate Maxwell Boltzmann Catalysts & reaction profiles Dynamic Equilibrium Le Chatelier's Principle	Equilibrium constants K_c & K_p Factors affecting equilibria Acid Base theory pH definition K_w K_a Titrations & indicators Buffers	
Prior Knowledge Required	GCSE atomic structure and bonding	GCSE redox and half equations GCSE quantitative chemistry	GCSE groups of the periodic table GCSE enthalpies	GCSE organic chemistry	GCSE rates and equilibrium	Year 12 Equilibria I	
Feedback Points							
Key Questions	- Who discovered the subatomic particles? - What are the key structures/properties of the subatomic particles? - Why do isotopes have identical chemical properties? - Can I analyse and interpret data from a mass spectrum and calculate relative atomic mass	- What does oxidation number mean? - What is disproportionation - How do I use oxidation numbers in nomenclature? - Can I construct a full ionic equation using two half equations?	- Can I explain the trend in ionisation energy down group 2? - What are the reactions of the group 2 elements with oxygen, chlorine and water? - What are the trends in solubility of the hydroxides and sulfates of group 2 elements?	- What is meant by homologous series? - What are the nomenclature rules for naming organic compounds? - What is isomerism and why does it arise? - How are we meeting the increasing demand for fuels?	- What is reaction rate? - Can I explain the effects of changing conditions on reaction rates using collision theory? - What is activation energy? - What is the role of a catalyst in increasing the rate of a reaction? - Can I use the Maxwell-Boltzmann distribution curve to	- Can I deduce an expression for K_c and for K_p for heterogeneous and homogeneous systems? - What is the effect of temperature, concentration, pressure and catalysts on equilibrium constants?	

	<p>from the relative abundance of isotopes and vice versa?</p> <ul style="list-style-type: none"> - Can I draw and describe the shapes of s and p orbital? - Predict the electron configuration of an atom using both spdf AND 'electrons in boxes' notation? - What is ionisation energy? - Can I explain how ionisation energies are influenced by number of protons, electron shielding and the orbital from which the electron is removed? - Can I explain the trend in ionisation energy across a period AND down a group? - I know how to illustrate periodicity using data. <p>- Use metallic bonding to explain the physical properties of metals?</p> <p>- How do the physical properties of ionic compounds depend on the structure of ionic bonding?</p> <p>- Which orbitals overlap in the formation of sigma and pi bonds?</p> <p>- How does the bond length in a covalent bond affect its strength?</p> <p>- What is electronegativity?</p> <p>- What is the octet rule?</p> <p>- How is a dative covalent bond formed and how is it different to a simple covalent bond?</p> <p>- What is the electron pair repulsion theory and how does this govern the shape of a molecule?</p> <p>- What is the difference between a polar and non-polar molecule?</p> <p>- Can I explain the different intermolecular interactions eg instantaneous, induced and permanent dipoles AND hydrogen bonds?</p> <p>- How do physical properties of materials depend on their intermolecular interactions?</p>	<ul style="list-style-type: none"> - Can I use moles to calculate masses, volumes, concentrations and formulae? - Have my practical skills developed successfully so that I carry out a titration to give accurate and precise results whilst considering errors and uncertainties? 	<ul style="list-style-type: none"> - What factors affect the thermal stability of group 2 compounds? - How do I test for cations and anions? - Can I explain the trend in reactivity of group 7 elements? - What reactions of the halides can I use to illustrate the trend in reducing ability of the halide ions? - Why is it important to use standard conditions when comparing enthalpy changes? - What are the key definitions for enthalpy changes of formation, combustion and neutralisation? - Do I know how to calculate enthalpy changes given experimental data? - How is Hess's Law used to determine enthalpy changes of reactions that can be determined directly? - Do I know how to use bond enthalpies to calculate enthalpy changes of reaction, and mean bond enthalpies from enthalpy changes of reaction? 	<ul style="list-style-type: none"> - What are the pollution problems arising from the combustion of fuels? - How does a catalytic converter solve some of the problems caused by pollutants? - What are the key steps in a free radical substitution reaction mechanism? - Why do addition reactions occur? - What is meant by halogenation? - What are the key steps in an addition reaction mechanism? - How are we dealing with polymer waste? - What are the key steps in a nucleophilic substitution reaction? - How can alcohols be oxidised and what are the products that can be formed by this process? - How does fragmentation occur inside the mass spectrometer? - How to use mass spectra to identify the structures of organic compounds? - What happens when molecules absorb infrared radiation? - How to use infrared spectra to identify the structures of organic compounds? 	<p>explain effect of temperature and catalysts?</p> <ul style="list-style-type: none"> - What is a reversible and irreversible reaction? - How is dynamic equilibrium established within a given reaction? - How is Le Chatelier's Principle used to explain the effect of concentration, pressure and temperature on equilibrium composition? - Can I deduce an expression for Kc for heterogeneous and homogeneous systems? 	<ul style="list-style-type: none"> - What is meant by a Bronsted-Lowry acid and base? - What is a conjugate acid-base pair in terms of proton transfer? - Can I identify conjugate acid-base pairs in any given reaction? - What is the relationship between hydrogen ion concentration and pH? - What is the method used to calculate the pH of aqueous solutions? - What is the difference between a strong and weak acid? - How do I calculate Ka and Kw? - How do I draw and interpret titration curves? - How do we select a suitable indicator for an acid-base titration? - What is a buffer? 	
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	<ul style="list-style-type: none"> - Explain the anomalous properties of water resulting from hydrogen bonding? - Can I explain what happens when dissolving occurs? 						
Direct Vocab Instruction	<ul style="list-style-type: none"> - Sub-atomic particles - Isotopes - Relative abundance - Orbitals - Ionisation energy - Periodicity - Sigma and pi bonds - Electron pair repulsion - Intermolecular - Intramolecular - Instantaneous - Induced - Dipole 	<ul style="list-style-type: none"> - Oxidation - Reduction - Disproportionation - Concentration - Moles - Empirical - Molecular 	<ul style="list-style-type: none"> - Enthalpy - Formation - Combustion - Neutralisation 	<ul style="list-style-type: none"> - Homologous - Saturated - Unsaturated - Displayed - Structural - Skeletal - Molecular - Nomenclature - Isomerism - Stereoisomerism - Geometric - Fractional distillation - Cracking - Reforming - Combustion - Catalytic converter - Mechanism - Initiation - Propagation - Termination - Electrophile - Nucleophile - Carbocation - Dehydration - Ethanolic - Halogenation - Hydrolysis - Reflux - Solvent extraction - Fragmentation 	<ul style="list-style-type: none"> - Activation - Reversible - Irreversible - Dynamic Equilibrium - Homogeneous - Heterogeneous 	<ul style="list-style-type: none"> - Conjugate - Buffer 	
Standardised Homework	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	

Year 12 Biology	Term 1		Term 2		Term 3		End Points
	Biological Molecules [? lessons]	Cells [? lessons]	Exchange and Transport [? lessons]	DNA, Variation and Interdependence [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic							
Skill	Experimental Planning Graphical Interpretation Maths	Experimental Planning Graphical Interpretation Maths Microscopy	Experimental Planning Graphical Interpretation Maths Dissection	Experimental Planning Graphical Interpretation Maths			

Content	Introduction to biological molecules Carbohydrates - monosaccharides Carbohydrates - disaccharides and polysaccharides Starch, glycogen and cellulose Lipids Proteins Enzymes Rate of enzyme controlled reactions Enzyme inhibition Structure of genetic material DNA replication ATP and energy Water and its functions CP: Food Test CP: Enzyme Factors	Light microscopes Electron microscopes Microscope calculations Eukaryotic cell structure Cell specialisation and organisation Prokaryotic cells and viruses Mitosis and the Cell cycle Structure of cell membranes Diffusion, osmosis and active transport Co-transport (absorption in the ileum) Defence mechanisms Phagocytes Cell mediated response Humoral response Antibodies Vaccination HIV CP: Microscopy CP: Membrane Permeability CP: Water Potential	Calculations of surface area and volume Gas exchange in single celled organisms Gas exchange in insects and fish Gas exchange in plants Limiting water loss in plants and insects Structure of human gas exchange system Mechanisms of breathing and gas exchange The digestive system and enzymes Absorption of digested materials Haemoglobin Transport by haemoglobin Circulatory systems in mammals Heart structure and cardiac cycle Blood vessels Transport systems in plants CP: Heart Dissection CP Potometer	DNA and chromosomes Genes and the triplet code Structure of RNA Protein synthesis Mutations Meiosis and genetic variation Genetic diversity and adaptation Types of selection Taxonomy Diversity in communities Human impact on diversity Investigating diversity CP: Species Sampling			
Prior Knowledge Required (GCSE)	Food Types Enzyme Action DNA	Cellular Structure Microscopes Immune System Cellular Transport	Digestion Circulation Surface Area Mass Transport	DNA Classification Biodiversity Adaptations			
Feedback Points							
Key Questions	What are the different Biological Molecules? How are structure and function related with the different molecules? How does an enzyme work? What factors affect how an enzyme works? How does DNA replicate? Why is water such an important molecule?	What are the different cell types? What is in a cell? How does a microscope work? What is mitosis and why is it significant? How do cells move substances? How does our body defend itself? How does vaccination work?	How do organisms exchange substances with their environment? How are substances transported around an organism?	What is genetic material? What impacts do mutations have? How does genetic variation lead to selection? What is biodiversity and what impact do humans have?			
Direct Vocab Instruction	See lists on Science Hub	See lists on Science Hub	See lists on Science Hub	See lists on Science Hub			
Standardised Homework	10 Mark Recap Qs Core Practical Write Ups Exam Questions Wider Reading	10 Mark Recap Qs Core Practical Write Ups Exam Questions Wider Reading	10 Mark Recap Qs Core Practical Write Ups Exam Questions Wider Reading	10 Mark Recap Qs Core Practical Write Ups Exam Questions Wider Reading			

Year 13 Physics	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Waves	Thermodynamics	Oscillations	Cosmology	Synoptic Review	Exams	
Skill	CP6: Determine the speed of sound in air CP7: Investigate the effects of length, tension and mass per unit length on the frequency of a vibrating string or wire. CP8: Determine the wavelength of light from a laser or other light source using a diffraction grating.	CP12: Calibrate a thermistor in a potential divider circuit as a thermostat. CP13: Determine the specific latent heat of a phase change. CP14: Investigate the relationship between pressure and volume of a gas at fixed temperature.	CP16: Determine the value of an unknown mass using the resonant frequencies of the oscillation of known masses.	Sketch and interpret scientific diagrams Apply different methods for determining the distances to stars	Apply different parts of the specification to solve contextual problems		
Content	Wave Phase Superposition Standing Waves Diffraction Wave Interference Refraction Reflection, Total Internal Reflection Lenses Image Formation (Ray Diagrams) Polarization	Heat and Temperature Internal Energy Heat Transfer Ideal Gas Behaviour Kinetic Theory Equations Derivation of Kinetic Equations	Simple Harmonic Motion (SHM) Free and Forces Oscillations SHM Energy SHM Maths Resonance Damping	Gravitational Fields Gravitational Forces Starshine Stellar Classifications Measuring Astronomical Distances The Age of the Universe The Fate of the Universe	Circular motion with Gravitational fields Waves with Simple Harmonic motion Thermodynamics with Electricity Mechanics with Thermodynamics Particle physics with Electromagnetism		
Prior Knowledge Required	Types of Waves Refraction, reflection and EM spectrum	Gas volume and pressure laws Particle model of matter	Equations for motion in a circle	Astrophysics Red shift Life cycle of a star	All topics represented in the Physics equation sheet		
Feedback Points							
Key Questions	Describe longitudinal waves in terms of pressure variation and the displacement of molecules Explain what is meant by a standing/stationary wave and how such a wave is formed.	Explain the concepts of internal energy and absolute zero Explain what is meant by a black body radiator	Explain the conditions for simple harmonic motion Identify situations in which simple harmonic motion will occur Explain resonance	Explain how astronomical distances can be determined using trigonometric parallax Explain the Doppler effect	Compare electric fields with gravitational fields Explain how you can apply Newton's laws of motion and universal gravitation to orbital motion.		
Direct Vocab Instruction	Investigate Interpret Deduce	Interpret Derive	Interpret Analyse Conclude	Describe Interpret Deduce	Compare Apply		
Standardised Homework	- Pre-reading and note taking (flip learning)- Exam questions - Planning a practical - Writing up a core practical	- Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical	- Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical	- Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical			

Year 13 Chemistry	Term 1		Term 2		Term 3		End Points
	Half Term 1 [? lessons]	Half Term 2 [? lessons]	Half Term 3 [? lessons]	Half Term 4 [? lessons]	Half Term 5 [? lessons]	Half Term 6 [? lessons]	
Topic	Topic 13 Energetics II Topic 14 Redox II	Topic 15 Transition metals Topic 17 Organic chemistry II	Topic 16 Kinetics II Topic 19 Modern analytical techniques II	Topic 18 Organic chemistry III	Revision	Revision & exams	
Skill	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Numeracy - Practical skills - Writing balanced chemical equations - Reasoning - Analytical	- Practical skills - Writing balanced chemical equations - Reasoning - Analytical			
Content	Lattice enthalpy Born Haber cycles Polarisation Solubility Entropy Gibbs Free energy Feasibility and relationships (G/S/K) Standard Electrode potentials Electrochemical cells E cell calculations Storage and fuel cells Redox titrations	Chemical Properties Complex ions Colour Chromium Water and deprotonation Reactions Catalytic activity Chirality Carbonyl compounds Reactions of Carbonyls Carboxylic acids Reactions of Carboxylic acids Acyl chlorides Esters Condensation polymerisation and polyesters	Experimental techniques conc/time graphs Rate/conc graphs Order & rate reactions Order & mechanisms Arrhenius equation Mass spectrometry C NMR H NMR Chromatography	Benzene Reactions of Benzene Friedel Crafts Phenol Amines Amides Polyamides Amino acids & TLC Functional group tests Organic synthesis Grignards Experimental Techniques			
Prior Knowledge Required	Year 12 chemical energetics I Year 12 redox I	Year 12 redox I Year 12 organics I	Year 12 kinetics I	Year 13 organics II			
Feedback Points							
Key Questions	- Can I use the Born Haber Cycle to calculate lattice enthalpy? - What are enthalpy changes of atomisation, solution and hydration? - How does a cation polarise an anion? - Why do entropy changes occur during changes of state? - What is a spontaneous process? - How does the Second Law of Thermodynamics allow us to	- What is a ligand? - How does carbon monoxide prevent the transport of oxygen through the bloodstream? - How can transition metals act as catalysts? - What is a chiral molecule? - What is optical activity? - What is an enantiomer? - What is a racemic mixture?	- What are the different methods used to measure the rate of a reaction? - What relationship is shown by the rate equation? - What do we mean by the order of a reaction? - How can I use the initial-rate method and the continuous monitoring method to investigate reaction rates? - How can I deduce the rate-determining step from a rate equation?	- How are aromatic compounds different from aliphatic compounds in terms of their physical and chemical properties? - Why is it easier to brominate phenol compared to benzene? - What are the similarities between manufacturing polyamides and the formation of proteins from amino acids? - How can I increase the length of a carbon chain in a			

	<p>predict whether a process will occur?</p> <ul style="list-style-type: none"> - Can I calculate total entropy if I am given entropies of system and surroundings? - How is entropy related to enthalpy and temperature? - What is the relationship between entropy, Gibbs energy and equilibrium constants? <p>- How do I construct and electrochemical cell and use it to calculate cell potential (emf)?</p> <ul style="list-style-type: none"> - How are standard electrode (redox) potentials determined? - How to use redox potentials to predict feasibility of a chemical reaction? - How does a storage cell work? - What is a fuel cell? 	- What are the different types of reaction mechanism?	<ul style="list-style-type: none"> - What is an SN1 and SN2 reaction mechanism? - Can I use the Arrhenius equation to explain the effect of temperature on the rate constant of a reaction? <p>- How to use nuclear magnetic resonance spectra to identify the structures of organic compounds?</p> <ul style="list-style-type: none"> - What is chemical shift? - What is a chemical environment? - What is the difference between high resolution and low-resolution NMR spectroscopy? - How does the movement of the mobile phase in HPLC differ from gas chromatography? 	molecule using a Grignard reagent?			
Direct Vocab Instruction	<ul style="list-style-type: none"> - Atomisation - Entropy - Spontaneous - Electrochemical - Electrode potential - Feasibility 	<ul style="list-style-type: none"> - Ligand - Monodentate - Bidentate - Multidentate - Chiral - Chirality - Enantiomer - Racemic mixture - Polarised 	<ul style="list-style-type: none"> - High performance liquid chromatography - Chemical shift - Chemical environments - Singlet - Doublet - Triplet - Quartet 	<ul style="list-style-type: none"> - Aliphatic - Aromatic - Delocalised - Solvent extraction - Recrystallisation - Solvent extraction 			
Standardised Homework	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 	<ul style="list-style-type: none"> - Pre-reading and note taking (flip learning) - Exam questions - Planning a practical - Writing up a core practical 			

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Topic	Energy Transfer	Responses to Change	Genetics, Populations and Ecosystems	Gene Expression			
Skill							
Content	Overview of photosynthesis Light-dependent reaction	Receptors Control of heart rate	Monohybrid inheritance Dihybrid inheritance	Gene mutations Stem cells			

	Light-independent reaction Glycolysis Link reaction and krebs cycle Oxidative phosphorylation Anaerobic respiration Energy transfers in ecosystems Nutrient cycles Uses of fertilisers and environmental impacts	Neurones and the nervous system Resting membrane potential Action potentials Passage of an action potential Speed of conductance Synapses (structure and transmission) Skeletal muscles Contraction of muscles Homeostasis Feedback mechanisms Regulation of glucose Diabetes and control Regulation of water (osmoregulation) Nephrons Role of hormones in osmoregulation	Probability and genetic crosses Codominance and multiple alleles Sex-linkage and autosomal-linkage Epistasis Population genetics and variation in phenotypes Natural selection Different forms of selection Isolation and speciation Population in ecosystems Competition Predation Investigating populations Succession Conservation	Regulation of transcription and translation Epigenetic control Gene expression and cancer Genome projects Recombinant DNA technology Creating DNA fragments In-vivo gene cloning In-vitro gene cloning Locating genes, genetic screening and counselling Genetic fingerprinting		
Prior Knowledge Required	See GCSE Units 4 and 7	See GCSE Unit 5	See GCSE Units 6 and 7	See GCSE Unit 6		
Feedback Points						
Key Questions	How does photosynthesis work? What factors affect photosynthesis? How does respiration take place? How does energy move between organisms? What are nutrient cycles and what are their significance?	How does the body communicate with itself? What conditions are needed for the body to function properly? How are these conditions controlled? How is movement controlled?	How are characteristics inherited? What is natural selection? How do new species form? How do different species interact with each other? How can we investigate populations? How do new habitats develop?			
Direct Vocab Instruction						
Standardised Homework						