

Throughout the year the department and the subjects review the order in which we deliver the scheme of work to ensure that knowledge and understanding is built upon as progression is made through the syllabus.				
<u>Timeline</u>	<u>Topic</u>	<u>Key concepts and knowledge</u>	<u>Skills development</u>	<u>Rationale</u>
<b>Y10 - half term 1</b>	Communicable diseases	<p>Understand that pathogens are microorganisms that cause infectious disease. Pathogens may be viruses, bacteria, protists or fungi.</p> <p>Describe how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens.</p> <p>Describe how our body's immune system (white blood cells) destroy the pathogen and prevent disease.</p> <p>Explain how vaccination will prevent illness in an individual.</p> <p>Understand that antibiotics are used to treat bacterial infections however some have now become resistant to these antibiotics.</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical – opportunity to recap aseptic techniques practical</p> <p>Extended writing – students will focus linking ideas together through extended response answers to prepare for higher demand questions as the curriculum progresses.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Evaluation                      Pattern                      Describe                      Conclude                      Because                      Quantity                      Range</p> <p><b><u>Links to careers in:</u></b></p> <p>Immunologist                      Microbiologist                      Medical microbiologist                      Virologist                      GUM Nurse                      GUM Doctor                      Public health scientist</p> <p><b><u>Development of employability skills:</u></b></p>	<p>This topic introduces more complex cellular structures that builds upon knowledge of basic cell structure covered previously in the curriculum.</p> <p>It allows students to deepen their understanding as the curriculum progresses to more difficult concepts such as vaccination, monoclonal antibodies and plant diseases.</p>

		<p>Describe the process of discovery and development of potential new medicines, including preclinical and clinical testing.</p> <p><b>HIGHER TIER ONLY</b> - Describe how monoclonal antibodies are produced.</p> <p><b>HIGHER TIER ONLY</b> describe some of the ways in which monoclonal antibodies can be used.</p> <p>Apply scientific knowledge to detect and identify plant disease.</p> <p>Describe how nitrate and magnesium deficiencies affect plant growth.</p> <p>Describe physical and chemical plant defence responses.</p>	<p>Problem solving                  Communication                  Team work                  Creativity                  Numeracy                  Informed                  Self-management  <u>Development of British Values</u>                  Tolerance                  Rule of law                  Mutual respect                  Individual liberty  <u>Cultural Capital</u>                  Tolerance                  Rule of law                  Mutual respect                  Individual liberty</p>	
	Chemical Changes	<p>To explain reduction and oxidation in terms of loss or gain of oxygen and recall that metals react with oxygen to produce metal oxides.</p>	<p><b><u>Skill development and application</u></b>                  Required practical-                  1. Making Salts                  2: determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration.                  3. Electrolysis</p>	<p>This topic introduces more complex knowledge on previous topics such as the pH scale, reactions of acids and alkalis and builds up to more challenging tasks such as neutralisation equations,</p>

		<p>To recall and describe the reactions of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids and where appropriate, to place these metals in order of reactivity.</p> <p>Describe that metals less reactive than carbon can be extracted from their oxides by reduction with carbon.</p> <p>HIGHER TIER ONLY –Write ionic equations for displacement reactions and explain oxidation/reduction in terms of electrons.</p> <p>Describe electrolysis in terms of molten organic compounds, extracting metals and of aqueous solutions.</p> <p>Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution and use the pH scale to identify acidic or alkaline solutions.</p>	<p>Maths – chemical calculations in titrations, half equations.</p> <p>Extended writing – Students focus on extended response skills by describing the methods for the above required practical's.</p> <p style="text-align: center;"><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Calculate                  Explain                  Hypothesis                  Identify                  Investigate                  Method                  Technique</p> <p><b><u>Links to careers in:</u></b></p> <p>Chemical engineer                  Chef                  Pharmacist                  Lab technician                  Chemical analyst                  Cleaner</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem solving                  Self-management                  Team work</p> <p><b><u>Development of British Values</u></b></p>	<p>predicting products of electrolysis and interpreting and predicting displacement reactions.</p> <p>The skills of analysing data that have been embedded at previous points in the curriculum are further embedded during this topic.</p> <p>The cross curricular links with maths are further developed during this topic through chemical calculations.</p>
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		electrolysis (HIGHER TIER – including writing half equations)		
	Particle mode of matter	<p>To recognise/draw simple diagrams to model the difference between solids, liquids and gases and explain the difference in density.</p> <p>Recall the equation for calculating density.</p> <p>Describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved and interpret heating and cooling graphs.</p> <p>Define internal energy.</p> <p>Apply equations for calculating:</p> <ul style="list-style-type: none"> <li>- Change in thermal energy</li> <li>- Energy for change of state</li> </ul> <p>Explain how the motion of the molecules in a gas is related to both its temperature and its pressure</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical:                      5. Density                      Maths – calculating density and specific latent heat,                      Extended writing</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Calculate                      Compare                      Explain                      Formula                      Interpret                      Method                      Volume</p> <p><b><u>Links to careers in:</u></b></p> <p>Materials Engineer                      Research Scientist                      Product Development Scientist                      Product Designed                      Coolant Engineer</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem Solving                      Numeracy                      Informed</p> <p><b><u>Development of British Values</u></b></p>	<p>The particle theory is covered previously in the curriculum and in Chemistry so students build on this knowledge to incorporate more complex ideas such as pressure, density, internal energy and changing state.</p> <p>It also allows students to apply mathematical skills to specific latent heat and interpreting graphs on changing state.</p>

		<p>Explain qualitatively the relation between the temperature of a gas and its pressure at constant volume</p> <p>Use the particle model to explain how increasing the volume in which a gas is contained, at constant temperature, can lead to a decrease in pressure.</p> <p>Calculate the change in the pressure of a gas or the volume of a gas (a fixed mass held at constant temperature) when either the pressure or volume is increased or decreased.</p> <p>Apply the equation:  <i>pressure × volume = constant</i></p> <p>Explain how, in a given situation eg a bicycle pump, doing work on an enclosed gas leads to an increase in the temperature of the gas.</p>	<p>British values to be demonstrated in the over-arching culture established within the classroom and school.</p> <p><b>Cultural Capital</b></p> <p>Those who have never used a hand pump (for tyres etc) will not have experienced it warming up with use.</p> <p>Can create misconceptions when teaching “work done on a gas”.</p> <p style="padding-left: 40px;">A good opportunity to talk about Archimedes, and to tell the story of the discovery of Archimedes’ Principle, presents itself in the Eureka Can Required Practical.</p>	

<p><b>Y10 – half term 2</b></p>	<p>Respiration and Photosynthesis</p>	<p>Recall and describe the process of photosynthesis and limiting factors of photosynthesis.</p> <p>HIGHER TIER - understand and use inverse proportion – the inverse square law and light intensity in the context of photosynthesis.</p> <p>Describe cellular respiration as an exothermic reaction which is continuously occurring in living cells and compare aerobic and anaerobic respiration.</p> <p>Describe metabolism as the sum of all the reactions in a cell or the body.</p> <p>HIGHER TIER - Understand and explain what is meant by oxygen debt.</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical-                      5. Photosynthesis and light Intensity allows students’ progress their skills on collecting and recording and analysing data and apply maths skills to new equations and graphs.</p> <p>Extended response – compare aerobic and anaerobic respiration, effect of exercise on the body, recall of required practical method.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Accurate                      Analyse                      Reliable                      Repeat                      Average                      Trend                      Result</p> <p><b><u>Links to careers in:</u></b></p> <p>Respiratory physiologist                      Doctor                      Nurse                      Plant biologist                      Farmer                      Horticultural scientist                      Agricultural business manager</p> <p><b><u>Development of employability skills:</u></b></p>	<p>This topic is underpinned by previous knowledge on cell structure and photosynthesis/respiration covered in KS3 and KS4. The spiralling of knowledge builds a greater depth of understanding in order to tackle more difficult skills such as comparing aerobic and anaerobic respiration.</p>
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	<p>Energy Changes – Endothermic and Exothermic reactions</p>	<p>Describe reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic, and evaluate uses and applications of reactions using given information.</p> <p>Draw, use and interpret reaction profiles.</p> <p>HIGHER TIER - calculate the energy transferred in chemical</p>	<p><u><b>Skill development and application</b></u>                  Required practical:                  4. Temperature changes</p> <p>Maths – calculating temperature change, half equations.</p> <p>Extended writing – evaluating hydrogen fuel cells, evaluation of every day uses of endothermic and exothermic reactions.</p> <p><u><b>Practice of tier 3 literacy include:</b></u>                  Evaluate</p>	<p>This topic introduces new concepts of energy changes during reaction and encompasses previous work in Physics on energy stores and transfer. This builds challenge through interpreting reaction profiles, interpreting and analysing reactions.</p> <p>Previous work on half equations is continued in this</p>



		<p>reactions using bond energies supplied.</p> <p>Interpret data for relative reactivity of different metals and evaluate the use of cells.</p> <p>Evaluate the use of hydrogen fuel cells in comparison with rechargeable cells and batteries (HIGHER TIER- write half equations)</p>	<p>Calculate Investigate Explain</p> <p><b><u>Links to careers in:</u></b>                      Chef                      Lab Technician                      Forensic scientist                      Criminal investigator</p> <p><b><u>Development of employability skills:</u></b>                      Problem solving                      Self-management                      Team work</p> <p><b><u>Development of British Values</u></b>                      Self-help                      Self-responsibility                      Equality                      Equity                      Solidarity</p> <p><b><u>Cultural Capital</u></b>                      Use of heat packs and sports injury packs (make your own?)                      Make your own cell and battery</p>	<p>topic from the previous topic to further embed this skill.</p>
	<p>Atomic structure – Atoms and isotopes</p>	<p>Recall the basic structure of an atom is a positively charged nucleus composed of both protons and neutrons surrounded by negatively charged electrons.</p>	<p><b><u>Skill development and application</u></b></p> <p>Maths – calculating half-lives, nuclear equations, calculating protons and neutrons.</p> <p>Extended writing – history of the atom, evaluating theories, comparing theories of the atom.</p>	<p><b><u>Cross curricular links with Chemistry allows students to spiral previous knowledge on the history of the atom into this topic and tackle more in depth theory on the current model of the atom, isotopes,</u></b></p>

		<p>Represent elements and interpret their mass number, atomic number and use this to calculate the number of protons/neutrons.</p> <p>To relate differences between isotopes to differences in conventional representations of their identities, charges and masses.</p> <p>Describe the development of the model of the atom.</p> <p>Recall the properties of different types of ionising nuclear radiation (alpha, gamma and beta), and be aware of the risks and hazards of exposure to radiation and how we can reduce contamination.</p> <p>Write balanced equations that show single alpha (<math>\alpha</math>) and beta (<math>\beta</math>) decay.</p> <p>Explain the concept of half-life and how it is related to the random nature of radioactive decay and determine half life from graphs or data.</p>	<p style="text-align: center;"><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Calculate Data Environment Explain Identify Research Environment</p> <p><b><u>Links to careers in:</u></b> Nuclear Physicists Pipeline engineers Radiographers Food Safety Atomic Physicist</p> <p><b><u>Development of employability skills:</u></b> Team work Numeracy Creative Informed</p> <p><b><u>Development of British Values</u></b> Self-help Self-responsibility Equality</p> <p><b><u>Cultural Capital</u></b> Nuclear Power Plant visit STEM Club</p>	<p style="text-align: center;"><b><u>mass number and atomic number.</u></b></p> <p style="text-align: center;"><b><u>This then underpins more complex tasks like nuclear equations and half life.</u></b></p>
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		<p>Explain why the hazards associated with radioactive material differ according to the half-life involved.</p> <p>Describe and evaluate the use of nuclear radiation in exploration and treatment of internal organs.</p> <p>Draw/interpret diagrams representing nuclear fission and how a chain reaction may occur.</p> <p>Describe the process of nuclear fission and fusion.</p>		
<b>Y10 – half term 3</b>	Homeostasis And response	<p>Describe the structure and function of the nervous system and how it can bring about fast responses.</p> <p>Translate information about reaction times between numerical and graphical forms.</p> <p>Identify the cerebral cortex, cerebellum and medulla on a diagram of the brain, and describe their functions. Explain some of the difficulties of</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical- 6. Reaction times progress students skills on collecting, recording and presenting data. Opportunities to analyse data and evaluate methods is also covered. Extended writing – comparative writing and planning investigations.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Accurate Analyse Anomalous Average</p>	<p>This topic introduces more complex knowledge on the nervous and endocrine system building on previous knowledge of levels of organisation covered earlier in the curriculum.</p> <p>The skills of analysing data that have been embedded at previous points in the curriculum are further embedded during this topic. Whilst introducing cross curricular links with maths</p>

		<p>investigating brain function and treating brain damage and disease.</p> <p>Identify the main structures of the eye and their functions.</p> <p>Interpret ray diagrams, showing myopia and hyperopia of the eye and demonstrate how spectacle lenses correct them.</p> <p>Explain how body temperature is controlled by thermoregulation.</p> <p>Describe the principles of hormonal coordination and control by the human endocrine system.</p> <p>Explain how insulin controls blood glucose (sugar) levels in the body.</p> <p>Compare Type 1 and Type 2 diabetes and explain how they can be treated.</p> <p>HIGHER TIER ONLY - Explain how glucagon interacts</p>	<p>Conclude                  Control                  Dependent                  Describe                  Evaluation                  Explanation                  Fair test                  Improvements                  Line graph                  Line of best fit                  Pattern                  Precise                  Range                  Relationship                  Repeat                  Smaller increments                  Trend</p> <p><b><u>Links to careers in:</u></b>                  IVF/Medical careers                  Optometry                  Diabetes treatment</p> <p><b><u>Development of employability skills:</u></b>                  Problem solving                  Communication – debate around kidney treatment + fertility treatment                  Informed</p> <p><b><u>Development of British Values</u></b>                  Rule of law – rules around fertility treatment/controlling fertility                  Mutual respect – varying opinions</p>	<p>with reference to looking at trends in data and identifying anomalous results from graphs/tables.</p>
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		<p>with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.</p> <p>Describe the function of kidneys in maintaining the water balance of the body including ADH, and the effect on cells of osmotic changes in body fluids.</p>	<p>Tolerance of different cultures/opinions – contraception</p> <p><b>Cultural Capital</b>                  Diabetes treatment – some may be completely unaware of the causes/treatment/lifestyle choices                  Controlling fertility – NHS information/cost/evaluating different methods                  Awareness of other IVF – some may know people experience it some may have no idea what it entails</p>	
	<p>The rate and extent of chemical change</p>	<p>Calculate rates of reaction and draw and interpret graphs on the amount of product formed against time, draw and use tangents to measure the rate of reaction.</p> <p>HIGHER TIER -calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time.</p> <p>Recall factors affecting rates of reaction</p> <p>Predict and explain using collision theory the effects of changing</p>	<p><b>Skill development and application</b>                  Required practical's                  5. Rates of reaction                  Maths – measuring rates of reaction, drawing and interpreting graphs and data on rate of reactions, comparing rates using tangents.</p> <p>Extended writing – Description of required practical,</p> <p><b>Practice of tier 3 literacy include:</b>                  Accurate                  Analyse                  Calculate                  Compare                  Conclude</p>	<p>This topic is underpinned by the basic concepts of particle theory covered in previous parts of the curriculum. This allows students to build a greater depth of understanding on collision theory and apply this to more complex tasks such as calculating rates.</p> <p>Cross curricular links with maths are embedded multiple times in this topic through calculating rates, drawing and interpreting graphs through to more challenging tasks such as drawing tangents to calculate and compare rates</p>

		<p>conditions of concentration, pressure, temperature, SA:Vol ratio on the rate of a reaction.</p> <p>Describe that chemical reactions can occur only when reacting particles collide with each other and with sufficient energy. The minimum amount of energy that particles must have to react is called the activation energy.</p> <p>Identify catalysts in reactions and explain catalytic action in terms of activation energy. Describe reversible reactions and how equilibrium is reached</p> <p>HIGHER TIER - make qualitative predictions about the effect of changes on systems at equilibrium when given appropriate information.</p> <p>HIGHER TIER - interpret appropriate given data to predict the effect of a change in concentration of a reactant or product, temperature and pressure on given reactions at equilibrium.</p>	<p>Data                  Design                  Estimate                  Evaluate                  Explain                  Factor                  Formula                  Hypothesis                  Interpret                  Investigate                  Method                  Percent                  Proportion                  Range                  Technique</p> <p><b><u>Links to careers in:</u></b></p> <p>Chemical Analyst                  Chef                  Structural Engineer                  Chemical Engineer                  Pharmacist                  School lab technician</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem solving                  Communication                  Self-management                  Teamwork                  numeracy</p> <p><b><u>Development of British Values</u></b></p> <p>Self-help                  Self-responsibility</p>	<p>at different points during a reaction.</p>
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			<p><b>Cultural Capital</b>                  Knowledge of industries where this can be applied eg fertiliser manufacture</p>	
	Forces – Forces and their interactions	<p>Describe the interaction between pairs of objects which produce a force on each object. The forces to be represented as vectors.</p> <p>Understand that all forces between objects are either:</p> <ul style="list-style-type: none"> <li>• contact forces – the objects are physically touching</li> <li>• non-contact forces – the objects are physically separated.</li> </ul> <p>Understand the difference between mass and weight.</p> <p>Recall and apply the equation:                  weight = mass × gravitational field strength</p> <p>Calculate the resultant of two forces that act in a straight line</p> <p>Recall and apply the equation:                  work done = force × distance (moved along the line of action of the force)</p>	<p><b><u>Skill development and application</u></b>                  Required practical-                  7. Forces and extension of a spring                  Maths – recall and application of equations.</p> <p>Extended writing  <b><u>Practice of tier 3 literacy include:</u></b></p> <p>Calculate                  Conclude                  Data                  Explain                  Formula                  Method                  Range</p> <p><b><u>Links to careers in:</u></b></p> <p>Road safety officer                  Manufacturing – vehicles                  Safety testing – car manufacturing                  Public services – police – road safety and accident investigation</p> <p><b><u>Development of employability skills:</u></b>                  Numeracy                  Problem solving                  Self- management                  Team work                  Creativity</p> <p><b><u>Development of British Values</u></b></p>	<p><b>This topic is underpinned by KS3 work on forces and builds deeper knowledge on interactions between forces, weight, resultant forces, work done and elasticity. The topic spirals back through the basic concepts of forces covered in KS2 and KS3 and introduces more complex tasks as the topic progresses.</b></p> <p><b>The cross curricular links with maths continue with the use of equations, graph skills and concept of proportionality.</b></p> <p><b>There is also a continued focus on the skill of recalling the equations required in the Physics curriculum.</b></p>

		<p>Convert between newton-metres and joules.</p> <p>The extension of an elastic object, such as a spring, is directly proportional to the force applied.</p> <p>Recall and apply the equation:  <i>force = spring constant × extension</i></p> <p>Apply the equation:              elastic potential energy = <math>0.5 \times \text{spring constant} \times \text{extension}^2</math></p> <p>Describe example where forces cause rotation, explain how levers and gears transmit rotational effects on forces and calculate the size of a force or its distance from a pivot, acting on an object that is balanced.</p> <p>Recall and apply the equation:  <i>moment of a force = force × distance</i></p> <p>Explain why, in a liquid, pressure at a point increases with the height of the column of liquid</p>	<p>British values to be demonstrated in the over-arching culture established within the classroom and school:              Self-help              Self-responsibility  <u><b>Cultural Capital</b></u>              Visit from local PSCO – road safety awareness              STEM investigations- forces, parachutes falling etc.</p>	
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		<p>above that point and with the density of the liquid.</p> <p>Calculate the differences in pressure at different depths in a liquid.</p> <p>Recall and apply the equation:  <math>\text{pressure} = \frac{\text{force normal to a surface}}{\text{area of that surface}}</math></p> <p>Describe the factors which influence floating and sinking.</p> <p>Apply the equation:  <math>\text{pressure} = \text{height of the column} \times \text{density of the liquid} \times \text{gravitational field strength}</math></p> <p>Describe a simple model of the Earth's atmosphere and of atmospheric pressure</p> <p>Explain why atmospheric pressure varies with height above a surface.</p>		
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<p><b>Y10 – half term 4</b></p>	<p>Homeostasis – Reproductive hormones</p>	<p>Describe the role of hormones in reproduction and in the menstrual cycle.</p> <p>Understand and explain how scientists to use these hormones to develop contraceptive drugs but also drugs which can increase fertility.</p> <p>Evaluate hormonal and non-hormonal contraception.</p> <p>Describe the roles of hormones in human reproduction, including the menstrual cycle.</p> <p>HIGHER TIER ONLY - explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle.</p> <p>HIGHER TIER ONLY – Explain how adrenaline and thyroxine work in a negative feedback system.</p> <p>Describe and explain how plant hormones effect growth in response to light and gravity and how ethane and gibberellins affect plants.</p>	<p><b><u>Skill development and application</u></b></p> <p><b><u>Required practical 8 -</u></b> : investigate the effect of light or gravity on the growth of newly germinated seedlings.</p> <p>Extended writing – comparative writing on different methods of contraception, the interaction of hormones in the reproductive system.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Accurate                  Analyse                  Anomalous                  Average                  Conclude                  Control                  Dependent                  Describe                  Evaluation                  Explanation                  Fair test                  Improvements                  Line graph                  Line of best fit                  Pattern                  Precise                  Range                  Relationship                  Repeat                  Smaller increments                  Trend</p>	<p>This topic introduces more complex knowledge on the endocrine system building on previous knowledge of levels of organisation covered earlier in the curriculum. The topic builds in challenge by incorporating ideas such as negative feedback cycles and the effect of multiple hormones on hormonal systems.</p> <p>The topic provides opportunities for extended response practice and evaluation skills.</p>
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	Organic Chemistry - Carbon compounds as fuels and feedstock.	Understand that most of the compounds in crude oil are hydrocarbons, which are	<p><b>Skill development and application</b></p> <p>Maths – balancing equations.                  Extended writing</p>	This topic introduces more complex knowledge on chemical formula and elements/compounds

		<p>molecules made up of hydrogen and carbon atoms only.</p> <p>Recognise and recall the alkanes methane, ethane, propane and butane.</p> <p>Explain how fractional distillation works in terms of evaporation and condensation.</p> <p>Recall how boiling point, viscosity and flammability change with increasing molecular size.</p> <p>Write balanced equations for the complete combustion of hydrocarbons with a given formula</p> <p>Describe trends in the properties of hydrocarbons</p> <p>Describe in general terms the conditions used for catalytic cracking and steam cracking.</p> <p>Balance chemical equations as examples of cracking given the formulae of the reactants and products</p>	<p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Analyse                  Calculate                  Compare                  Data                  Environment                  Ethic                  Evaluate                  Explain                  Justify                  Method                  Percent                  Proportion                  Range                  Similar                  Technique</p> <p><b><u>Links to careers in:</u></b></p> <p>Stock trader                  Environmental Scientist                  Welder                  Gas Engineer                  Fire fighter                  Ground Worker</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem solving                  Communication                  Self-management                  Teamwork                  numeracy</p>	<p>covered previously in the curriculum. It allows application of chemistry to everyday life through applying properties of hydrocarbons to their uses in industry.</p> <p>The challenge develops as the topic progresses to more complex ideas such as polymerisation and cracking.</p> <p>The cross curricular content with biology means ideas of DNA structure and protein synthesis are recapped to build a deeper level of understanding.</p>
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		<p>Draw diagrams and use models to represent addition polymerisation.</p> <p>Explain the basic principles of condensation polymerisation by reference to the functional groups in the monomers and the repeating units in the polymers.</p> <p>HIGHER TIER -Describe how amino acids produce proteins by condensation polymerisation,.</p> <p>Describe the structure of DNA and other naturally occurring polymers</p>		
	<p>Forces – Forces and motion</p>	<p>Make measurements of distance and time and then calculate speeds of objects.</p> <p>Recall and apply the equation:  <i>distance travelled = speed × time</i></p> <p>Recall typical values of speeds for basic movements and transport.</p> <p>Draw distance–time graphs from measurements and extract and</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical-              8. Acceleration              Maths              Extended writing</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Calculate              Conclude              Data              Explain              Formula</p>	<p><b>This topic is underpinned by KS3 work on forces and motion and spirals this knowledge to build a deeper understanding on distance-time graphs, velocity-time graphs, investigating motion.</b></p> <p><b>The concepts covered are a continuation from the previous topic on forces and builds up to more complex concepts.</b></p>

		<p>interpret lines and slopes of distance–time graphs, translating information between graphical and numerical form and calculate speed.</p> <p>Recall and apply the equation:  <math>acceleration = \frac{\text{change in velocity}}{\text{time taken}}</math></p> <p>draw velocity–time graphs from measurements and interpret lines and slopes to determine acceleration</p> <p>Apply the equation:  <math>final\ velocity^2 - initial\ velocity^2 = 2 \times acceleration \times distance</math></p> <p>Apply Newton’s First Law to explain the motion of objects moving with a uniform velocity and objects where the speed and/or direction changes</p> <p>Apply Newton’s Second Law: The acceleration of an object is proportional to the resultant force acting on the object, and inversely proportional to the mass of the object.</p>	<p>Method                  Range  <u>Links to careers in:</u>                  Road safety officer                  Manufacturing – vehicles                  Safety testing – car manufacturing                  Public services – police – road safety and accident investigation</p> <p><u>Development of employability skills:</u>                  Numeracy                  Problem solving                  Self- management                  Team work                  Creativity</p> <p><u>Development of British Values</u>                  British values to be demonstrated in the over-arching culture established within the classroom and school:                  Self-help                  Self-responsibility</p> <p style="text-align: center;"><u>Cultural Capital</u></p> <p>Visit from local PSCO – road safety awareness                  STEM investigations- forces, parachutes falling etc.</p>	<p><b>The cross curricular links with maths continue with the use of equations, graph skills and gradients.</b></p> <p><b>There is also a continued focus on the skill of recalling the equations required in the Physics curriculum.</b></p>
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		<p>Recall and apply the equation:  <i>resultant force = mass × acceleration</i></p> <p>Apply Newton’s Third Law to examples of equilibrium situations</p> <p>Understand and interpret information and data regarding stopping distance, thinking distance, braking distance and reaction time and the factors affecting these.</p> <p>HIGHER ONLY – recall and apply the equation:  <i>momentum = mass × velocity</i></p> <p>Use the concept of momentum as a model to:</p> <ul style="list-style-type: none"> <li>• describe and explain examples of momentum in an event, such as a collision</li> <li>• explain safety features such as: air bags, seat belts, gymnasium crash mats, cycle helmets and cushioned surfaces for playgrounds</li> </ul>		
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		<ul style="list-style-type: none"> <li>complete calculations involving an event, such as the collision of two objects.</li> </ul> <p>Recall and apply the equation:  <i>momentum = mass × velocity</i></p> <p>Apply equations relating force, mass, velocity and acceleration to explain how the changes involved are inter-related.</p> <p>The equations <math>F = m \times a</math> and <math>a = \frac{v - u}{t}</math> combine to give the equation  <math display="block">F = \frac{m \Delta v}{\Delta t}</math></p>		
<b>Year 10 half term 5</b>	Genetics – Reproduction	<p>Understand that meiosis leads to non-identical gamete cells being formed while mitosis leads to identical cells being formed.</p> <p>Explain the advantages and disadvantages of asexual and sexual reproduction for any organism if given appropriate information.</p>	<p><b><u>Skill development and application</u></b></p> <p>Extended writing – comparative writing on meiosis and mitosis, detailed descriptions of protein synthesis.</p> <p>Maths skills – Proportion and ratio’s from Punnett square diagrams.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Bar chart          Because          Conclude</p>	<p>This topic spirals knowledge from year 9 on specialised cells and DNA and extends knowledge to applying the concepts to fertilisation, protein synthesis and inheritance.</p> <p>The cross curricular links with maths in this topic allow for implementation of proportions and ratios to</p>

		<p>To describe in detail the structure of DNA and define genome.</p> <p>HIGHER TIER ONLY – Describe the process of protein synthesis and explain the effect of mutations on DNA and protein synthesis.</p> <p>Understand that when gametes join at fertilisation genes from one partner are combined with new genes from the sexual partner to produce unique offspring.</p> <p>Be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.</p>	<p>Describe Divisions Evaluation Pattern Observe</p> <p><b><u>Links to careers in:</u></b></p> <p>Genetic counselling Genetic research/treatment of disorders Conservation of ecosystems/species Archaeology Lab work – bacterial research</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem solving Communication Creativity Numeracy Informed</p> <p><b><u>Development of British Values</u></b></p> <p>Tolerance of different cultures/religions – genetic testing/theories of evolution Rule of law – limits to genetic testing/embryo screening Mutual respect – varying opinions/thoughts/ethics</p> <p><b><u>Cultural Capital</u></b></p> <p>Awareness of inherited disorders may be limited.</p>	<p>Punnett squares to predict phenotypes of offspring.</p>
	<p>Chemical Analysis - Purity formulations and chromatography.</p>	<p>Use melting point and boiling point data to distinguish pure from impure substances</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical's- 6. Chromatography 7. use of chemical tests to identify the ions</p>	<p>Students spiral back through previous curriculum content on pure and impure substances and separating</p>

	<p>Identification of common gases.</p>	<p>Identify formulations given appropriate information.</p> <p>Explain how paper chromatography separates mixtures and interpret chromatograms and determine Rf values from chromatograms.</p> <p>Describe the tests for chlorine, oxygen, carbon dioxide and hydrogen.</p> <p>Identify some metal ions (cations). Lithium, sodium, potassium, calcium and copper compounds from flame tests.</p> <p>Write balanced equations for the reactions to produce the insoluble hydroxides</p> <p>Recall the tests for negative ions.</p> <p>State advantages of instrumental methods compared with the chemical tests in this specification.</p>	<p>Maths – balances equations                  Extended writing</p> <p style="text-align: center;"><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Accurate                  Analyse                  Calculate                  Compare                  Data                  Estimate                  Formula                  identify                  Interpret                  Investigate                  Method                  Similar                  Technique</p> <p style="text-align: center;"><b><u>Links to careers in:</u></b></p> <p>Chemical Analyst                  Hospitality and Cleaning                  Food Standards Inspector                  Chemical engineer                  Forensic Scientist                  Pest Control</p> <p style="text-align: center;"><b><u>Development of employability skills:</u></b></p> <p>Problem solving                  Communication</p>	<p>mixtures. The curriculum then develops to tackle more challenging tasks such as calculating Rf values, interpreting chromatograms, flame tests and linking chromatograms to pure and impure substances.</p>
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		<p>Interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set in the same form, limited to flame emission spectroscopy.</p>	<p>Self-management                  Teamwork                  numeracy  <u><b>Development of British Values</b></u>                  Self-help                  Self-responsibility  <u><b>Cultural Capital</b></u>                  Knowledge of related analytical careers and processes such as drug analysis, the environment agency.</p>	
	<p>Waves Waves in air , fluid and solids</p>	<p>Describe the difference between longitudinal and transverse waves</p> <p>Describe wave motion in terms of their amplitude, wavelength, frequency and period.</p> <p>Apply the equation  <math display="block">period = \frac{1}{frequency}</math></p> <p><i>Recall and apply the equation:                  wave speed = frequency × wavelength</i></p> <p>Describe a method to measure the speed of sound waves in air and speed of ripples on a water surface.</p>	<p><u><b>Skill development and application</b></u>                  Require practical's-                  9 Investigating Waves                  Physics only - investigate the reflection of light by different types of surface and the refraction of light by different substances.                  Maths                  Extended writing</p> <p><u><b>Practice of tier 3 literacy include:</b></u>                  Analyse                  Calculate                  Compare                  Explain                  Method</p> <p><u><b>Links to careers in:</b></u>                  Sound Engineer                  Acoustic Design                  Music Production                  Seismologist</p>	<p>Students spiral back through previous curriculum content on waves. The curriculum then develops to tackle more challenging tasks such as calculating wave speed and period.</p> <p>There is opportunity to develop practical skills during this topic through investigating waves and analysing the results.</p>

		<p>Construct ray diagrams to illustrate the refraction of a wave at the boundary between two different media</p> <p>Show how changes in velocity, frequency and wavelength, in transmission of sound waves from one medium to another, are inter-related.</p> <p>Construct ray diagrams showing reflection of a wave at a surface and describe the effects of reflection, transmission and absorption of waves at material interfaces.</p> <p>Describe the conversion of soundwaves to vibrations in solids e.g human ear.</p> <p>Explain in qualitative terms, how the differences in velocity, absorption and reflection between different types of wave in solids and liquids can be used both for detection and exploration of hidden structures..</p>	<p>Medical Physicist</p> <p><b><u>Development of employability skills:</u></b>                  Problem Solving                  Numeracy                  Informed                  Creativity</p> <p><b><u>Development of British Values</u></b>                  British values to be demonstrated in the over-arching culture established within the classroom and school.</p> <p><b><u>Cultural Capital</u></b>                  The EM Spectrum provides lots of opportunities here.</p> <ul style="list-style-type: none"> <li>- Talk about how the discovery of EM Spectrum has revolutionised communication</li> <li>- Tell the story of Herschel discovering the light beyond what our eyes can see.</li> </ul> <p>An opportunity to teach the link between thunder and lightning.</p> <p>Can talk about radiation and surfaces to explain why: polar bears are white, fridges are white, computers are black etc.</p>	
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<p><b>Y10 – half term 6</b></p>	<p>Variety and Evolution</p>	<p>Describe simply how the genome and its interaction with the environment influence the development of the phenotype of an organism.</p> <p>Understand that variation generated by mutations and sexual reproduction is the basis for natural selection; use this to describe how this can lead to the formation of a new species.</p> <p>Describe how scientists intervene through selective breeding to produce livestock and plants with favoured characteristics and explain the impacts of this process.</p> <p>Describe genetic engineering and evaluate the use of GM in agriculture and medicine.</p> <p>Describe how plants or animals can be cloned to produce large numbers of identical individuals all carrying the favourable characteristic (cuttings, tissue culture, embryo</p>	<p><b><u>Skill development and application</u></b>                  Extended response – Selective breeding application to different scenarios. Evaluation of genetic engineering. Applying the steps of natural selection to different organisms.</p> <p><b><u>Practice of tier 3 literacy include:</u></b>                  Bar chart                  Because                  Conclude                  Describe                  Divisions                  Evaluation                  Pattern                  Observe</p> <p><b><u>Links to careers in:</u></b>                  Genetic counselling                  Genetic research/treatment of disorders                  Conservation of ecosystems/species                  Archaeology                  Lab work – bacterial research</p> <p><b><u>Development of employability skills:</u></b>                  Problem solving                  Communication                  Creativity                  Numeracy                  Informed</p> <p><b><u>Development of British Values</u></b>                  Tolerance of different cultures/religions – genetic testing/theories of evolution</p>	<p>This topic amalgamates lots of different concepts covered previously in the curriculum allowing a much deeper level of knowledge to be developed. Previous topics such as cells, DNA, Meiosis, reproduction all come together in this unit.</p> <p>The challenge builds in the curriculum through extended response skills and applying theories to different scenarios and contexts.</p>
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		<p>transplants and adult cell cloning)</p> <p>Describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and speciation, and how fossils and antibiotic resistance provide evidence for this.</p> <p>Describe the development of our understanding of genetics including the work of Mendel.</p> <p>Describe how fossils are formed.</p> <p>Extract and interpret information from charts, graphs and tables such as evolutionary trees.</p> <p>Describe the factors that could lead to extinction of a species.</p> <p>Use information given to show understanding of the Linnaean system and describe how developments in biology impacted the classification system.</p>	<p>Rule of law – limits to genetic testing/embryo screening</p> <p>Mutual respect – varying opinions/thoughts/ethics</p> <p><b>Cultural Capital</b></p> <p>Wider knowledge of selective breeding – not just cows/sheep</p> <p>Varying awareness of certain genetic diseases</p> <p>Use of GM is less developed countries e.g golden rice where food deficiencies exist</p> <p>Classification and organisms used – some students may have limited knowledge of more exotic organisms</p>	
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	<p>Chemistry of the Atmosphere –</p>	<p>Interpret evidence and evaluate different theories about the Earth’s early atmosphere.</p> <p>Describe how oxygen has increased.</p> <p>Describe how carbon dioxide has decreased.</p> <p>Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.</p> <p>Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter</p> <p>Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane, ways to reduce emissions and the effects of global climate change.</p> <p>Evaluate the quality of evidence in a report about global climate change given appropriate information</p>	<p><b><u>Skill development and application</u></b></p> <p>Maths                  Extended writing – describe the greenhouse effect and consequences of climate change, evaluations on information regarding global climate change</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Proportion                  Volume                  Percent                  Hypotheses                  Environment                  Data                  Compare</p> <p><b><u>Links to careers in:</u></b></p> <p>Mechanic/MOT tester                  Environment agency                  Politician                  World leaders                  Vehicle manufacture                  Farmer/agriculture                  Astronaut/NASA</p> <p><b><u>Development of employability skills:</u></b></p> <p>Numeracy                  Informed                  Communication</p> <p><b><u>Development of British Values</u></b></p> <p>Mutual respect</p>	<p>This topic has cross curricular links with biology and geography and incorporates knowledge from photosynthesis, hydrocarbons, greenhouse gases and allows students to link these concepts together to tackle more challenging tasks such as extended response answers, evaluating theories and interpreting/analysing data and graph.</p>
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		Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels and explain the problems caused by increased pollutants in the air.	Rule of law Democracy <b>Cultural Capital</b> e.g. Californian/Australian bushfires Climate change effects around world e.g. temp records being broken UN Climate Change Conference (COP)/G7	
	Waves – waves in air, fluids and solids (continued)		<b>Skill development and application</b>  <b>Practice of tier 3 literacy include:</b> Analyse Calculate Compare Explain Method  <b>Links to careers in:</b> Sound Engineer Acoustic Design Music Production Seismologist Medical Physicist  <b>Development of employability skills:</b> Problem Solving Numeracy Informed Creativity <b>Development of British Values</b>	

			<p>British values to be demonstrated in the over-arching culture established within the classroom and school.</p> <p><b><u>Cultural Capital</u></b></p> <p>The EM Spectrum provides lots of opportunities here.</p> <ul style="list-style-type: none"> <li>- Talk about how the discovery of EM Spectrum has revolutionised communication</li> <li>- Tell the story of Herschel discovering the light beyond what our eyes can see.</li> </ul> <p>An opportunity to teach the link between thunder and lightning.</p> <p>.</p>	
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