KS4 – Curriculum map – Year 10 trilogy

CARR HILL HIGH SCHOOL
Commitment Aspiration Resilience Respect

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.

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

		Describe the process of discovery and development of potential new medicines, including preclinical and clinical testing.	<u>Development of employability skills:</u> 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	
	Chemical Changes	To explain reduction and oxidation in terms of loss or gain of oxygen and recall that metals react with oxygen to produce metal oxides. 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.	**<u>Skill development and application</u>** Required practical- 1. Making Salts 2. Electrolysis Maths - Extended writing – Students focus on extended response skills by describing the methods for the above required practicals. **<u>Practice of tier 3 literacy include:</u>**	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, predicting products of electrolysis and interpreting and predicting displacement reactions.

		Describe that metals less reactive than carbon can be extracted from their oxides by reduction with carbon. HIGHER TIER ONLY – explain in terms of gain or loss of electrons, that these are redox reactions 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. Understand that Acids are neutralised by alkalis (eg soluble metal hydroxides) and bases (eg insoluble metal hydroxides and metal oxides) to produce salts and water, and by metal carbonates to produce salts, water and carbon dioxide. HIGHER TIER – Use and explain the terms dilute, concentrated, strong, weak in relation to acids	Calculate Explain Hypothesis Identify Investigate Method Technique **Links to careers in:** Chemical engineer Chef Pharmacist Lab technician Chemical analyst Cleaner **Development of employability skills:** Problem solving Self-management Team work **Development of British Values** Self-help Self-responsibility Equality Equity Solidarity **Cultural Capital** Day with the lab technician Link acid spills to titrations and knowledge of neutralisation	The skills of analysing data that have been embedded at previous points in the curriculum are further embedded during this topic.

		Recall that acids react with some metals to produce salts and hydrogen. Describe the process of electrolysis and uses of electrolysis. HIGHER TIER ONLY –Write ionic equations for displacement reactions and explain oxidation/reduction in terms of electrons.		
	Particle mode of matter	To recognise/draw simple diagrams to model the difference between solids, liquids and gases and explain the difference in density. Recall the equation for calculating density. Describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved and interpret heating and cooling graphs. Define internal energy.	**<u>Skill development and application</u>** Required practical: 5. Density Maths – calculating density and specific latent heat, Extended writing **<u>Practice of tier 3 literacy include:</u>** Calculate Compare Explain Formula Interpret Method Volume	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. It also allows students to apply mathematical skills to specific latent heat and interpreting graphs on changing state.

		Apply equations for calculating: – Change in thermal energy – Energy for change of state Higher tier - calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives.	**Links to careers in:** Materials Engineer Research Scientist Product Development Scientist Product Designed Coolant Engineer **Development of employability skills:** Problem Solving Numeracy Informed **Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school. **Cultural Capital** Those who have never used a hand pump (for tyres etc) will not have experienced it warming up with use. Can create misconceptions when teaching "work done on a gas". 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.	
Y10 – half term 2	Respiration and Photosynthesis	Recall and describe the process of photosynthesis and limiting factors of photosynthesis. HIGHER TIER - understand and use inverse proportion – the	**Skill development and application** 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.	This topic is underpinned by previous knowledge on cell structure and photosynthesis/respiration covered in KS3 and KS4. The spiralling of knowledge builds

		inverse square law and light intensity in the context of photosynthesis. HIGHER TIER - Explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor. Describe cellular respiration as an exothermic reaction which is continuously occurring in living cells and compare aerobic and anaerobic respiration. Describe metabolism as the sum of all the reactions in a cell or the body.	**Practice of tier 3 literacy include:** Accurate Analyse Reliable Repeat Average Trend Result **Links to careers in:** Respiratory physiologist Doctor Nurse Plant biologist Farmer Horticultural scientist Agricultural business manager **Development of employability skills:** Communication Team work Numeracy Informed Digital skills Problem solving **Development of British Values** Mutual respect Solidarity Self-help **Cultural Capital**	a greater depth of understanding in order to tackle more difficult skills such as comparing aerobic and anaerobic respiration.

			Respiration investigations may include working with live organisms – discussion of the ethics involved and safe handling of. How much experience do students have of plants – have they ever grown a plant from a seed? Ever looked after a plant?	
	Energy Changes – Endothermic and Exothermic reactions	Describe reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. Draw, use and interpret reaction profiles. HIGHER TIER - calculate the energy transferred in chemical reactions using bond energies supplied.	**Skill development and application** Required practical: 4. Temperature changes Maths – calculating temperature change. Extended writing **Practice of tier 3 literacy include:** Evaluate Calculate Investigate Explain **Links to careers in:** Chef Lab Technician Forensic scientist Criminal investigator **Development of employability skills:** Problem solving Self-management Team work **Development of British Values** Self-help	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.

			Self-responsibility Equality Equity Solidarity **Cultural Capital** Use of heat packs and sports injury packs (make your own?) Make your own cell and battery	
	Atomic structure – Atoms and isotopes	Recall the basic structure of an atom is a positively charged nucleus composed of both protons and neutrons surrounded by negatively charged electrons. Represent elements and interpret their mass number, atomic number and use this to calculate the number of protons/neutrons. To relate differences between isotopes to differences in conventional representations of their identities, charges and masses. Describe the development of the model of the atom.	**Skill development and application** Maths – calculating half-lives, nuclear equations, calculating protons and neutrons. Extended writing – history of the atom, evaluating theories, comparing theories of the atom. **Practice of tier 3 literacy include:** Calculate Data Environment Explain Identify Research Environment **Links to careers in:** Nuclear Physicists Pipeline engineers Radiographers Food Safety	**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, mass number and atomic number.** **This then underpins more complex tasks like nuclear equations and half life.**

		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. Write balanced equations that show single alpha (α) and beta (β) decay. 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.	Atomic Physicist **Development of employability skills:** Team work Numeracy Creative Informed **Development of British Values** Self-help Self-responsibility Equality **Cultural Capital** Nuclear Power Plant visit STEM Club	
Y10 – half term 3	Homeostasis And response	Describe the structure and function of the nervous system and how it can bring about fast responses. Describe the principles of hormonal coordination and control by the human endocrine system. Explain how insulin controls blood glucose (sugar) levels in the body.	**Skill development and application** 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. **Practice of tier 3 literacy include:** Accurate Analyse Anomalous Average	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. 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

		HIGHER TIER - Explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.	Conclude Control Dependent Describe Evaluation Explanation Fair test Improvements Line graph Line of best fit Pattern Precise Range Relationship Repeat Smaller increments Trend **Links to careers in:** IVF/Medical careers Optometry Diabetes treatment **Development of employability skills:** Problem solving Communication – debate around kidney treatment + fertility treatment Informed **Development of British Values** Rule of law – rules around fertility treatment/controlling fertility Mutual respect – varying opinions	with reference to looking at trends in data and identifying anomalous results from graphs/tables.

			Tolerance of different cultures/opinions – contraception **<u>Cultural Capital</u>** 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	
	The rate and extent of chemical change	Calculate rates of reaction and draw and interpret graphs on the amount of product formed against time. 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. Recall factors affecting rates of reaction Describe that chemical reactions can occur only when reacting particles collide with each other and with sufficient energy. The minimum amount of energy that	**<u>Skill development and application</u>** Required practical's 5. Rates of reaction Maths – measuring rates of reaction, drawing and interpreting graphs on rate of reactions, comparing rates using tangents. Extended writing – Description of required practical. **<u>Practice of tier 3 literacy include:</u>** Accurate Analyse Calculate Compare Conclude Data Design	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. 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

		particles must have to react is called the activation energy. Describe reversible reactions and how equilibrium is reached HIGHER TIER - Predict and explain using collision theory the effects of changing conditions of concentration, pressure, temperature on the rate of a reaction.	Estimate Evaluate Explain Factor Formula Hypothesis Interpret Investigate Method Percent Proportion Range Technique **Links to careers in:** Chemical Analyst Chef Structural Engineer Chemical Engineer Pharmacist School lab technician **Development of employability skills:** Problem solving Communication Self-management Teamwork numeracy **Development of British Values** Self-help Self-responsibility **Cultural Capital**	at different points during a reaction.

			Knowledge of industries where this can be applied eg fertiliser manufacture	
	Forces – Forces and their interactions	Describe the interaction between pairs of objects which produce a force on each object. The forces to be represented as vectors. Understand that all forces between objects are either: • contact forces – the objects are physically touching • non-contact forces – the objects are physically separated. Understand the difference between mass and weight. Recall and apply the equation: weight = mass × gravitational field strength Calculate the resultant of two forces that act in a straight line Recall and apply the equation: work done = force × distance (moved along the line of action of the force)	**Skill development and application** Required practical- 7. Forces and extension of a spring Maths – recall and application of equations. Extended writing **Practice of tier 3 literacy include:** Calculate Conclude Data Explain Formula Method Range **Links to careers in:** Road safety officer Manufacturing – vehicles Safety testing – car manufacturing Public services – police – road safety and accident investigation **Development of employability skills:** Numeracy Problem solving Self- management Team work Creativity **Development of British Values**	**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.** **The cross curricular links with maths continue with the use of equations, graph skills and concept of proportionality.** **There is also a continued focus on the skill of recalling the equations required in the Physics curriculum.**

		Convert between newton-metres and joules. The extension of an elastic object, such as a spring, is directly proportional to the force applied. Recall and apply the equation: *force* = *spring constant* × *extension* Apply the equation: elastic potential energy =0.5 × spring constant × extension 2 Higher tier - use vector diagrams to illustrate resolution of forces, equilibrium situations and determine the resultant of two forces, to include both magnitude and direction (scale drawings only). Higher tier - If an object is accelerating, its speed at any particular time can be determined by drawing a tangent and measuring the gradient of the distance–time graph at that time	British values to be demonstrated in the over-arching culture established within the classroom and school: Self-help Self-responsibility **Cultural Capital** Visit from local PSCO – road safety awareness STEM investigations- forces, parachutes falling etc.	

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Y10 – half term 4	Homeostasis	Describe the role of hormones in reproduction and in the menstrual cycle. Understand that scientists to use these hormones to develop contraceptive drugs but also drugs which can increase fertility. HIGHER TIER ONLY - explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle. HIGHER TIER ONLY - Understand and explain how scientists to use these hormones to increase fertility. HIGHER TIER ONLY – Explain how adrenaline and thyroxine work in a negative feedback system.	**Skill development and application** Extended writing – comparative writing on different methods of contraception. **Practice of tier 3 literacy include:** 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 **Links to careers in:** IVF/Medical careers Optometry Diabetes treatment	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. 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 PSHE and maths with reference to contraception, looking at trends in data and identifying anomalous results from graphs/tables.

			Development of employability skills: Problem solving Communication – debate around kidney treatment + fertility treatment Informed **Development of British Values** Rule of law – rules around fertility treatment/controlling fertility Mutual respect – varying opinions Tolerance of different cultures/opinions – contraception **Cultural Capital** 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	
	Organic Chemistry - Carbon compounds as fuels and feedstock.	Understand that most of the compounds in crude oil are hydrocarbons, which are molecules made up of hydrogen and carbon atoms only. Recognise and recall the alkanes methane, ethane, propane and butane.	**Skill development and application** Maths – balancing equations. Extended writing **Practice of tier 3 literacy include:** Analyse Calculate Compare	This topic introduces more complex knowledge on chemical formula and elements/compounds covered previously in the curriculum. It allows application of chemistry to everyday life through applying properties of

		Explain how fractional distillation works in terms of evaporation and condensation. Describe trends in the properties of hydrocarbons Describe in general terms the conditions used for catalytic cracking and steam cracking. Recall that cracking produced alkenes and describe how bromine water is used to test for alkenes.	Data Environment Ethic Evaluate Explain Justify Method Percent Proportion Range Similar Technique **Links to careers in:** Stock trader Environmental Scientist Welder Gas Engineer Fire fighter Ground Worker **Development of employability skills:** Problem solving Communication Self-management Teamwork numeracy **Development of British Values** Solidarity **Cultural Capital**	hydrocarbons to their uses in industry.

			Knowledge of oil industry and world relations and impact on global economy. Knowledge of the internal combustion energy.	
	Forces – Forces and motion	Make measurements of distance and time and then calculate speeds of objects. Recall and apply the equation: *distance travelled* = *s peed* × *time* Recall typical values of speeds for basic movements and transport. Draw distance–time graphs from measurements and extract and interpret lines and slopes of distance–time graphs, translating information between graphical and numerical form and calculate speed. Recall and apply the equation: *acceleration* = change in velocity / *time taken* draw velocity–time graphs from measurements and interpret lines and slopes to determine acceleration	**Skill development and application** Required practical- 8. Acceleration Maths Extended writing **Practice of tier 3 literacy include:** Calculate Conclude Data Explain Formula Method Range **Links to careers in:** Road safety officer Manufacturing – vehicles Safety testing – car manufacturing Public services – police – road safety and accident investigation **Development of employability skills:** Numeracy Problem solving Self- management Team work	**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.** **The concepts covered are a continuation from the previous topic on forces and builds up to more complex concepts.** **The cross curricular links with maths continue with the use of equations, graph skills and gradients.** **There is also a continued focus on the skill of recalling the equations required in the Physics curriculum.**

		Apply the equation: *final velocity* 2 − *initial velocity* 2 = 2 × *acceleration* × *distance* 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 Higher tier - measure, when appropriate, the area under a velocity– time graph by counting squares. 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. Recall and apply the equation: *resultant force* = *mass* × *acceleration* Apply Newton's Third Law to examples of equilibrium situations	Creativity **Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school: Self-help Self-responsibility **Cultural Capital** Visit from local PSCO – road safety awareness STEM investigations- forces, parachutes falling etc.	

		Understand and interpret information and data regarding stopping distance, thinking distance, braking distance and reaction time and the factors affecting these. HIGHER ONLY – recall and apply the equation: *momentum = mass × velocity*		
Year 10 half term 5	Genetics – Reproduction	Understand that meiosis leads to non-identical gamete cells being formed while mitosis leads to identical cells being formed. To describe the structure of DNA and define genome. Understand that when gametes join at fertilisation genes from one partner are combined with new genes from the sexual partner to produce unique offspring. Be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.	**<u>Skill development and application</u>** Extended writing – comparative writing on meiosis and mitosis. Maths skills – Proportion and ratio's from Punnett square diagrams. **<u>Practice of tier 3 literacy include:</u>** Bar chart Because Conclude Describe Divisions Evaluation Pattern Observe **<u>Links to careers in:</u>** Genetic counselling Genetic research/treatment of disorders	This topic spirals knowledge from year 9 on specialised cells and DNA and extends knowledge to applying the concepts to fertilisation and inheritance. The cross curricular links with maths in this topic allow for implementation of proportions and ratios to Punnett squares to predict phenotypes of offspring.

		HIGHER TIER – Construct Punnett squares	Conservation of ecosystems/species Archaeology Lab work – bacterial research **Development of employability skills:** Problem solving Communication Creativity Numeracy Informed **Development of British Values** Tolerance of different cultures/religions – genetic testing/theories of evolution Rule of law – limits to genetic testing/embryo screening Mutual respect – varying opinons/thoughts/ethics **Cultural Capital** Wider knowledge of selective breeding – not just cows/sheep Varying awareness of certain genetic diseases Use of GM is less developed countries e.g golden rice where food deficiencies exist Classification and organisms used – some students may have limited knowledge of more exotic organisms	
	Chemical Analysis - Purity formulations and chromatography. Identification of common gases.	Use melting point and boiling point data to distinguish pure from impure substances Identify formulations given appropriate information.	**Skill development and application** Required practical's- 6. Chromatography Maths Extended writing	Students spiral back through previous curriculum content on pure and impure substances and separating mixtures. The curriculum then develops to tackle more

		Explain how paper chromatography separates mixtures and interpret chromatograms and determine Rf values from chromatograms. Describe the tests for chlorine, oxygen, carbon dioxide and hydrogen.	**Practice of tier 3 literacy include:** Accurate Analyse Calculate Compare Data Estimate Formula identify Interpret Investigate Method Similar Technique **Links to careers in:** Chemical Analyst Hospitality and Cleaning Food Standards Inspector Chemical engineer Forensic Scientist Pest Control **Development of employability skills:** Problem solving Communication Self-management Teamwork numeracy	challenging tasks such as calculating Rf values, interpreting chromatograms and linking chromatograms to pure and impure substances.

			Development of British Values Self-help Self-responsibility **Cultural Capital** Knowledge of related analytical careers and processes such as drug analysis, the environment agency.	
	Waves Waves in air , fluid and solids	Describe the difference between longitudinal and transverse waves Describe wave motion in terms of their amplitude, wavelength, frequency and period. Apply the equation *period* = $\frac{1}{frequency}$ *Recall and apply the equation: wave speed = frequency × wavelength* Describe a method to measure the speed of sound waves in air and speed of ripples on a water surface. Construct ray diagrams to illustrate the refraction of a	**Skill development and application** Require practical's- 9 Investigating Waves Maths Extended writing **Practice of tier 3 literacy include:** Analyse Calculate Compare Explain Method **Links to careers in:** Sound Engineer Acoustic Design Music Production Seismologist Medical Physicist **Development of employability skills:** Problem Solving Numeracy Informed Creativity	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. There is opportunity to develop practical skills during this topic through investigating waves and analysing the results.

		wave at the boundary between two different media Higher tier only – Use wave front diagrams to explain refraction in terms of the change of speed that happens when a wave travels from one medium to a different medium. Understand different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength. Some effects, for example refraction, are due to the difference in velocity of the waves in different substances. Describe how radio waves are produced by oscillations in electrical current	**Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school. **Cultural Capital** The EM Spectrum provides lots of opportunities here. - Talk about how the discovery of EM Spectrum has revolutionised communication - Tell the story of Herschel discovering the light beyond what our eyes can see. An opportunity to teach the link between thunder and lightning. Can talk about radiation and surfaces to explain why: polar bears are white, fridges are white, computers are black etc.	
Y10 – half term 6	Variety and Evolution	Understand that variation generated by mutations and sexual reproduction is the basis for natural selection; use this to describe how species evolve. Describe how scientists intervene through selective	**Skill development and application** Extended response – Selective breeding application to different scenarios**.** Evaluation of genetic engineering. Applying the steps of natural selection to different organisms. **Practice of tier 3 literacy include:** Bar chart	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,

		breeding to produce livestock and plants with favoured characteristics. Understand that taking genes from one species and introduce them in to the genome of another is called genetic engineering. HIGHER ONLY - describe the main steps in the process of genetic engineering. Understand that in spite of potential benefits genetic modification still remains highly controversial. Describe the factors that could lead to extinction of a species. Use information given to show understanding of the Linnaean system.	Because Conclude Describe Divisions Evaluation Pattern Observe **Links to careers in:** Genetic counselling Genetic research/treatment of disorders Conservation of ecosystems/species Archaeology Lab work – bacterial research **Development of employability skills:** Problem solving Communication Creativity Numeracy Informed **Development of British Values** Tolerance of different cultures/religions – genetic testing/theories of evolution Rule of law – limits to genetic testing/embryo screening Mutual respect – varying opinons/thoughts/ethics **Cultural Capital** Wider knowledge of selective breeding – not just cows/sheep	reproduction all come together in this unit. The challenge builds in the curriculum through extended response skills and applying theories to different scenarios and contexts.

			Varying awareness of certain genetic diseases Use of GM is less developed countries e.g golden rice where food deficiencies exist Classification and organisms used – some students may have limited knowledge of more exotic organisms	
	Chemistry of the Atmosphere –	Interpret evidence and evaluate different theories about the Earth's early atmosphere. Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas. Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter 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. Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels	**Skill development and application** Maths Extended writing – describe the greenhouse effect and consequences of climate change. **Practice of tier 3 literacy include:** Proportion Volume Percent Hypotheses Environment Data Compare **Links to careers in:** Mechanic/MOT tester Environment agency Politician World leaders Vehicle manufacture Farmer/agriculture Astronaut/NASA **Development of employability skills:**	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.

		and explain the problems caused by increased pollutants in the air.	Numeracy Informed Communication **Development of British Values** Mutual respect Rule of law Democracy **Cultural Capital** 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)	Give examples that illustrate the transfer of energy by electromagnetic waves. Recall some uses of EM waves Draw conclusions from given data about the risks and consequences of exposure to radiation. Describe the attraction and repulsion between unlike and like poles for permanent magnets and the difference between permanent and induced magnets.	**Skill development and application** Required practical- 10. Infrared radiation and absorption Maths Extended writing **Practice of tier 3 literacy include:** Analyse Calculate Compare Explain Method **Links to careers in:** Sound Engineer Acoustic Design Music Production Seismologist Medical Physicist	The topic continues from the previous topic on waves building up challenge through new content. Students spiral back through previous curriculum content on electromagnetic waves and magnetism. The curriculum then develops to tackle more challenging tasks such as magnetic fields, electromagnetism and radiation. There is opportunity to develop practical skills during this topic through investigating infrared radiation and absorption.

		Describe how to and draw the magnetic field pattern of a magnet using a compass. Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic Describe how and draw the magnetic effect of a current can be demonstrated using a solenoid and explain how a solenoid arrangement can increase the magnetic effect of the current. HIGHER ONLY – Apply Fleming's left hand rule and apply the equation: *force = magnetic f lux density × current × length* HIGHER ONLY - explain how the force on a conductor in a magnetic field causes the rotation of the coil in an electric motor.	**Development of employability skills:** Problem Solving Numeracy Informed Creativity **Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school. **Cultural Capital** The EM Spectrum provides lots of opportunities here. - Talk about how the discovery of EM Spectrum has revolutionised communication - Tell the story of Herschel discovering the light beyond what our eyes can see. An opportunity to teach the link between thunder and lightning. Can talk about radiation and surfaces to explain why: polar bears are white, fridges are white, computers are black etc.	