

<u>Timeline</u>	<u>Topic</u>	<u>Key concepts and knowledge</u>	<u>Skills development</u>	<u>Rationale</u>
<b><u>Y11 Half term 1</u></b>	<b>Classification and Ecology</b>	<p>Show understanding of the Linnaean system and describe how biological developments impacted the classification system.</p> <p>Recall Carl Woese 3 domain system.</p> <p>Extract and interpret information from charts, graphs and tables relating to the interaction of organisms within a community.</p> <p>Students should be able to extract and interpret information from charts, graphs and tables relating to the effect of biotic and abiotic factors on organisms within a community.</p> <p>Explain how organism are adapted to live in their natural environments.</p> <p>Correctly represent feeding relationships as food chains.</p>	<p><b><u>Skill development and application</u></b></p> <p>Required practical- 7. Quadrats</p> <p>Extended response – extended writing on adaptations.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Because Anomalous Analyse Conclude Control Dependent Describe Divisions Evaluation Explanation Line graph Line of best fit Relationship Repeat Result Trend</p> <p><b><u>Links to careers in:</u></b> Environmental studies – habitat management/conservation etc</p>	<p>Students are introduced to new concepts such as the classification system whilst building on previous knowledge on adaptations and competition.</p> <p>Opportunities in this topic to incorporate maths skills such as analysing and interpreting data and making conclusions from trends in data.</p>

		<p>Interpret predator prey relationships.</p> <p>Recall that many different materials cycle through the abiotic and biotic components of an ecosystem</p>	<p>Farming Genetic modification</p> <p><b><u>Development of employability skills:</u></b>                      Problem solving                      Communication                      Team work                      Numeracy                      Informed</p> <p><b><u>Development of British Values</u></b>                      Rule of law – surrounding GM/waste management/pollution                      Democracy – evaluating GM</p> <p><b><u>Cultural Capital</u></b>                      Some students may not have encountered exotic or aquatic organisms                      Lack of awareness of pollution and sustainability                      Range of uses of GM in other countries e.g golden rice where certain food deficiencies are present</p>	
	Using resources	<p>State examples of natural products that are supplemented or replaced by agricultural and synthetic products</p> <p>Distinguish between finite and renewable resources given appropriate information.</p>	<p><b><u>Skill development and application</u></b>                      Required practical-                      8. Water purification</p> <p>Maths – fractions, ratios, percentages, graphical forms.</p>	<p>Students explore the use of chemistry in various life situations, allowing them to apply their knowledge to real life applications.</p> <p>Opportunities for extended response through evaluation and comparative writing.</p>

		<p>Distinguish between potable water and pure water and give reasons for the steps used to produce potable water.</p> <p>Describe the differences in treatment of ground water and salty water.</p> <p>Outline treatment of waste water and comment on the relative ease of obtaining potable water from waste, ground and salt water.</p> <p>Higher tier only - evaluate alternative biological methods of metal extraction, given appropriate information.</p>	<p>Extended response – comparative writing, extended response.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Create                  Design                  Environment                  Ethic                  Method                  Evaluate                  Proportion/percent                  Investigate</p> <p><b><u>Links to careers in:</u></b></p> <p>Environment agency                  Farming/Agriculture                  Water treatment                  Recycling centres                  Builder                  Metal worker                  Politician/local governance                  Police/Law enforcement</p> <p><b><u>Development of employability skills:</u></b></p> <p>Problem solving                  Communication                  Creativity                  Informed</p> <p><b><u>Development of British Values</u></b></p> <p>Mutual respect</p>	
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			Democracy Rule of law  <u><b>Cultural Capital</b></u> Droughts in Australia (areas had no rain for 3 years), South East USA, reservoirs lower than they've ever been in Alabama (in 2021) Recycling at home...what happens to it after? Mining – impact on environment/planet/habitats Natural vs artificial fertilisers	
	Electromagnetic Waves  Black body radiation  Magnetism	Give examples that illustrate the transfer of energy by electromagnetic waves.  Brief explanations why each type of electromagnetic wave is suitable for the practical application.  Construct ray diagrams to illustrate the refraction of a wave at the boundary between two different media  Recall some uses of EM waves  Use wave front diagrams to explain refraction in terms of the change of speed that happens when a wave travels	<u><b>Skill development and application</b></u> Required practical- 10. Infrared radiation and absorption Maths Extended writing  Maths Extended writing  <u><b>Practice of tier 3 literacy include:</b></u> Calculate Conclude Data Explain Formula Method Range  <u><b>Links to careers in:</b></u>	The topic builds upon previous concepts taught on forces, magnetism and electromagnets.  The challenge builds through the introduction of new concepts such as induced magnets and solenoids.  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

		<p>from one medium to a different medium.</p> <p>Draw conclusions from given data about the risks and consequences of exposure to radiation.</p> <p>Construct ray diagrams to illustrate the similarities and differences between convex and concave lenses.</p> <p>Explain how colour of object is related to wavelengths of light, the effect of filters and why opaque objects have a particular colour.</p> <p>Explain the concept of black bodies and radiation.</p> <p>Describe attraction and repulsion between poles of permanent magnets and the difference between permanent and induced magnets</p> <p>Describe how to plot the magnetic field pattern of a magnet using a compass</p>	<p>Navigation – pilot/ ship captain                      Electrician                      Engineering                      Recycling technician                      Energy advisor                      Sound technician</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>                      British values to be demonstrated in the over-arching culture established within the classroom and school:                      Self-help                      Self-responsibility</p> <p><b><u>Cultural Capital</u></b>                      Careers events – engineering etc                      Investigations- making loudspeakers and electromagnets</p>	<p>magnetic fields, electromagnetism and radiation.</p> <p>There is opportunity to develop practical skills during this topic through investigating infrared radiation and absorption.</p>
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		Explain how a moving-coil loudspeaker and headphones work.		
<b><u>Year 11 half term 2</u></b>	<p>Organisation of an ecosystem</p> <p>Biodiversity</p> <p>Effect on human interaction on ecosystems</p> <p>Trophic levels</p> <p>Food production</p>	<p>Explain the importance of the carbon and water cycles to living organisms (and the importance of the microorganisms in carbon cycle).</p> <p>Describe the effect on biodiversity of waste, land use, deforestation and global warming.</p> <p>Describe some programmes to reduce the negative effect of humans on biodiversity.</p> <p>Explain how temperature, water and availability of oxygen affect the rate of decay of biological material.</p> <p>Calculate rate changes in the decay of biological material</p> <p>Evaluate the impact of environmental changes on the distribution of species in an</p>	<p><b><u>Skill development and application</u></b></p> <p><b><u>Required practical</u></b> –investigate the effect of temperature on the rate of decay</p> <p>Maths – calculating rate of decay, energy transfers, tangents, graph skills.</p> <p>Extended writing - opportunities for evaluative writing, extended responses on the water, carbon cycle and global warming.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Because</p> <p>Anomalous</p> <p>Analyse</p> <p>Conclude</p> <p>Control</p> <p>Dependent</p> <p>Describe</p> <p>Divisions</p> <p>Evaluation</p> <p>Explanation</p> <p>Line graph</p> <p>Line of best fit</p> <p>Relationship</p> <p>Repeat</p> <p>Result</p> <p>Trend</p>	<p>This topic continues to build challenge on ecosystems and communities. Cross curricular links with maths provide opportunities to apply maths skills such as mean, median, mode, calculating rate, energy transfers and graphs.</p> <p>Cross curricular links with chemistry and geography allow students to amalgamate ideas to deepen their knowledge of the effects of human activities on the environment, energy transfers and food production.</p> <p>Students spiral previous knowledge into more challenging concepts such as genetic modification.</p>

		<p>ecosystem given appropriate information.</p> <p>Describe the differences between the trophic levels of organisms within an ecosystem</p> <p>Construct accurate pyramids of biomass from appropriate data.</p> <p>Describe pyramids of biomass</p> <p>Explain how biomass is lost between the different trophic levels.</p> <p>Calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass.</p> <p>Explain how this affects the number of organisms at each trophic level.</p> <p>Describe some of the biological factors affecting levels of food security.</p> <p>Describe and explain some possible biotechnical and agricultural solutions, including</p>	<p><b><u>Links to careers in:</u></b>                  Environmental studies – habitat management/conservation etc                  Farming                  Genetic modification</p> <p><b><u>Development of employability skills:</u></b>                  Problem solving                  Communication                  Team work                  Numeracy                  Informed</p> <p><b><u>Development of British Values</u></b>                  Rule of law – surrounding GM/waste management/pollution                  Democracy – evaluating GM</p> <p><b><u>Cultural Capital</u></b>                  Some students may not have encountered exotic or aquatic organisms                  Lack of awareness of pollution and sustainability                  Range of uses of GM in other countries e.g golden rice where certain food deficiencies are present</p>	
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		<p>genetic modification, to the demands of the growing human population.</p> <p>Understand the use of sustainable fishing.</p>		
	<p>Life cycle assessment and recycling</p> <p>Using materials</p>	<p>Carry out simple comparative LCAs for shopping bags made from plastic and paper.</p> <p>Evaluate ways of reducing the use of limited resources, given appropriate information</p> <p>Describe experiments and interpret results to show that both air and water are necessary for rusting</p> <p>Explain sacrificial protection in terms of relative reactivity.</p> <p>Recall uses of alloys (Bronze, Brass, Steel) and interpret and evaluate the composition and uses of other alloys.</p> <p>Recall some examples of composites.</p>	<p><b><u>Skill development and application</u></b></p> <p>Maths – fractions, ratios, percentages, graphical skills.</p> <p>Extended response – comparative writing, extended response.</p> <p><b><u>Practice of tier 3 literacy include:</u></b></p> <p>Create                  Design                  Environment                  Ethic                  Method                  Evaluate                  Proportion/percent                  Investigate</p> <p><b><u>Links to careers in:</u></b></p> <p>Environment agency                  Farming/Agriculture</p>	<p>Students continue to explore the use of chemistry in various life situations, allowing them to apply their knowledge to real life applications.</p> <p>Opportunities for extended response through evaluation and comparative writing.</p> <p>Challenge builds through more difficult concepts and skills such as interpreting reaction conditions versus rate, applying principle of dynamic equilibrium to the Haber process and comparisons between industrial production and laboratory production of fertilisers.</p>

	<p>Explain how low density and high density poly(ethene) are both produced from ethane</p> <p>Explain the difference between thermosoftening and thermosetting polymers in terms of their structures.</p> <p>Compare the properties of thermosetting and thermosoftening polymers.</p> <p>Recall a source for the nitrogen and a source for the hydrogen used in the Haber process.</p> <p>Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid</p>	<p>Water treatment</p> <p>Recycling centres</p> <p>Builder</p> <p>Metal worker</p> <p>Politician/local governance</p> <p>Police/Law enforcement</p> <p><b>Development of employability skills:</b></p> <p>Problem solving</p> <p>Communication</p> <p>Creativity</p> <p>Informed</p> <p><b>Development of British Values</b></p> <p>Mutual respect</p> <p>Democracy</p> <p>Rule of law</p> <p><b>Cultural Capital</b></p> <p>Droughts in Australia (areas had no rain for 3 years), South East USA, reservoirs lower than they've ever been in Alabama (in 2021)</p> <p>Recycling at home...what happens to it after?</p> <p>Mining – impact on environment/planet/habitats</p> <p>Natural vs artificial fertilisers</p>	
<p>Induced potential, transformers and the National Grid</p> <p>Space Physics</p>	<p>Recall the factors that affect the size and direction of the induced potential difference/induced current.</p> <p>Apply the principles of the generator effect</p>	<p><b>Skill development and application</b></p> <p>Maths</p> <p>Extended writing</p> <p><b>Practice of tier 3 literacy include:</b></p> <p>Calculate</p> <p>Data</p> <p>Environment</p>	<p>The topic continued to build on the concepts of electromagnets. The challenge builds by adding in more complex concepts such as generator effect and induced current.</p>

		<p>Explain how a moving – coil microphone works.</p> <p>Explain how transformers work.</p> <p><u>Apply the equations:</u></p> $\left[ \frac{v_p}{v_s} = \frac{n_p}{n_s} \right]$ $V_s \times I_s = V_p \times I_p$ <p>Explain the life cycle of a star.</p> <p>Explain how fusion processes lead to the formation of new elements.</p> <p>Describe the similarities and distinctions between the planets, their moons, and artificial satellites.</p> <p>Explain qualitatively the changes in circular orbits and stable orbits.</p> <p>Understand, explain and apply the concepts of the Red Shift.</p>	<p>Explain              Identify              Research              Environment</p> <p><b><u>Links to careers in:</u></b>              Astronomers              Atmospheric and space scientists              Space Physicist  <i>Aerospace engineers</i>              Media and communications              Avionics technicians</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>              British values to be demonstrated in the over-arching culture established within the classroom and school:              Self-help              Self-responsibility</p> <p><b><u>Cultural Capital</u></b>              STEM Club              Science Museums              BAE visit to school – career workshops</p>	<p>Opportunities for application of knowledge to every day situations such the national grid and transformers.</p> <p>The introduction of new topics covered in Space Physics allow students to be challenged by more difficult concepts and apply their knowledge to a part of Physics not covered previously in the curriculum.</p>
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<p><b><u>Year 11 half term 3 + 4</u></b></p>	<p>Students recap required practical's, mathematic skills and topics to amalgamate their knowledge of the entire curriculum allowing them to link concepts together and master the more difficult skills previously covered.</p>			