



ASPIRE • BELIEVE • ACHIEVE



Curriculum Overview: Science

Year 7 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Concept of 'How Science Works,' applied through a variety of practical work that familiarises pupils with the secondary education science lab.</p> <p>The first science topic 'Cells' as the building blocks of all life.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Stages in the scientific process • Lab safety and appropriate equipment use • Label and characterise a variety of cells <p>Understanding</p> <ul style="list-style-type: none"> • The scientific process is one through which ideas continually evolve via prediction, analysis and evaluation. • Cells as the building blocks of all living things and the organelles of plants and animal cells <p>Skills</p> <ul style="list-style-type: none"> • Consistent use of scientific equipment appropriately and safely • Conducting a valid practical, identifying simple variables, writing a prediction and concluding from data • Interpretation of scientific drawings and graphs • Writing scientifically to describe and explain 	<p>Independently identifying risks within a practical and automatically taking appropriate precautions.</p> <p>Ability to link the prediction and conclusion of a practical with supporting numerical evidence from results – beginning to suggest reasons for unexpected results.</p> <p>Applying knowledge to a GCSE style question.</p> <p>Justify the likely identity of unknown cells as plant or animal.</p> <p>Desire to research more unusual organisms and the specific specialised cells that they have to help them survive.</p> <p>Independently producing a high quality project on the skeletal system with minimal guidance which demonstrates knowledge, understanding and creativity</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 7 Autumn Term 2

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The foundations of Physical science- forces relating to motion and exploring the gravitational forces at work in space.</p> <p>An introduction to Earth Chemistry through geology and study of rock formations</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Name a variety of forces and the effects they have on objects. • Name three different rock types and describe their formation <p>Understanding</p> <ul style="list-style-type: none"> • Show the forces acting on an object and suggest the overall (resultant) effect of these forces • Explain how rocks are 'recycled' between the three different rock varieties • The process in which theories develop and change over time <p>Skills</p> <ul style="list-style-type: none"> • Using units correctly • Use of a scientific formula • Present motion in distance or velocity time graphs and interpret these • Identify variables 	<p>Detailed interpretation of distance/velocity time graphs with additional calculations to support observations</p> <p>Comparison between the distance-time and velocity-time graphs and how they represent motion</p> <p>Independently identifying variables within a given practical.</p> <p>Applying conversion to convert data into standard units before applying scientific formula.</p> <p>Extended scientific writing piece on the natural 'recycling' or rock types or on the changing ideas of the solar system</p> <p>Independently producing a high quality project on the rock cycle or solar system with minimal guidance which demonstrates knowledge, understanding and creativity.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p> <p>Revision materials provided ready for AP1</p>

Year 8 Autumn Term 1

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Organ systems in living organisms focussing on the respiratory and digestive system.</p> <p>Contact forces and pressure</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Relationships of cells, tissues organs and organ systems • Identifying organs within the respiratory and digestive systems of humans and their functions. • Listing the health conditions that could affect these systems • Identify and label and greater variety of forces <p>Understanding</p> <ul style="list-style-type: none"> • Explaining how lifestyle can impact on the function of the organ systems • Linking the structure of the organs to their function • Understand the impact of forces on motion, deformation of substances including stretch and compression, floating and sinking <p>Skills</p> <ul style="list-style-type: none"> • Selecting materials to model organ systems • Identify variables in practical • Drawing scientifically • Write predictions and hypothesise 	<p>Consider the impact failure of these system will have on the wider human body in detail</p> <p>Evaluate specific lifestyle choices and programmes including those which are advertised as beneficial to us – e.g. diet programmes such as Atkins</p> <p>Individually conducting an investigation on sinking and floating - calculating density based on volume and mass and using this to predict whether a substance will sink or float in a variety of liquids including oils etc.</p> <p>Detailed justification of the materials chosen over others in order to best model the structure and function of the organ systems</p> <p>Combing knowledge of previous topics to explain the motion of materials in space.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 8 Autumn Term 2

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Earth's resources and the changing climate of the planet</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • The composition of our atmosphere • Definition of keywords, global warming, climate change, resources, sustainability, recycling. • Types of microorganism, methods of spreading disease and natural defences of the human body. • Scientific developments in treating disease, vaccines and antibiotics. <p>Understanding</p> <ul style="list-style-type: none"> • Describe the process of global warming and how population increase increases the rate of this. • The consequences of global warming • The impact of growing population on finite resources and the need to reduce, reuse and recycle • Measures to prevent and control outbreak • Why antibiotics cannot be used to treat common colds <p>Skills</p> <ul style="list-style-type: none"> • Graph construction and analysis • Writing scientifically to describe, explain, compare, justify and evaluate • Critically evaluate scientific claims considering validity • Using models to represent the abstract • Constructing detailed analysis of graphs with more than one piece of data 	<p>Evaluation of the recycling methods on a local, national and or global scale.</p> <p>Independently evaluate the evidence for and against global warming from a wide variety of sources to reach a justified conclusion – reference these sources.</p> <p>Independently evaluate the evidence for and against vaccines from a wide variety of sources to reach a justified conclusion – reference these sources.</p> <p>Independent research and construction of a models to show the defences of the human body – specifically white blood cells.</p> <p>Detailed, scientific extended writing to describe, explain, compare, justify and evaluate.</p> <p>Graph interpretation that describes the interaction between variables and changing patterns over time.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p> <p>Additional revision provided for AP1</p>

Year 9 GCSE Chemistry C1 Atomic Structure

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Atomic structure and Separating mixtures</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Structure of the atom • Key dates, scientists and developments in the history of the atom • Definitions of ions and isotopes • Methods in separating mixtures <p>Understanding</p> <ul style="list-style-type: none"> • How experiments have driven changed our understanding of atomic structure • Predict the ions formed from elements • Identify isotopes • Select appropriate methods of separating given mixtures <p>Skills</p> <ul style="list-style-type: none"> • Link a conclusion / investigation to the amendment of a scientific idea • Evaluate models used to explain the abstract • Confident use of symbols to represent elements and compounds 	<p>Application of knowledge to predict ion formations and begin to make the link between this and why only certain atoms bond together</p> <p>In depth understanding of the atomic mass number and how it can be a 0.5 value</p> <p>Extended scientific writing to describe the developments to the atomic model over time</p> <p>Justified reasoning of the separation method chosen and the strengths and limitations of each one</p> <p>Linking atomic structure to patterns previous explored in KS3 of the periodic table</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 9 GCSE Chemistry C2 The Periodic Table

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>History of the periodic table and how atomic structure can explain trends</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Key dates, scientists and developments in the history of the periodic table • Trends of group 1, 7 <p>Understanding</p> <ul style="list-style-type: none"> • Applying knowledge of atomic structure to explain the trends shown in the periodic table and predict the behaviour of 'unknown' atoms <p>Skills</p> <ul style="list-style-type: none"> • Make predictions using scientific knowledge and understanding • Drawing conclusions from data • Link a conclusion / investigation to the amendment of a scientific idea 	<p>Extended scientific writing that explains the trends shown in the periodic table in relation to their atomic structure.</p> <p>Effective and throughout use of data when drawing conclusions</p> <p>Independent research to expand on the history of the periodic table to include some of the more recently discovered elements</p> <p>Ability to create their own periodic table from the data they are given about each element and compare to the modern version.</p> <p>Extending thoughts to other groups in the periodic table to explain reactivity of the noble gases or question the reactivity of transition and group 4 elements</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 9 GCSE Chemistry C3 Structure and Bonding

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The structure of compounds, simple molecules and giant structures from the atomic level and their properties</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Three types of bonding to join two elements together • Names of giant structures and list their properties • Definition, properties and uses of fullerenes • The different products carbon can form <p>Understanding</p> <ul style="list-style-type: none"> • Explain why two elements should react together based on knowledge of atomic structure • Which types of elements experience which bonding and explanation of how the bonding takes place through either shared, delocalised or exchange of electrons • Explanation of the properties based on the bonding within the structure <p>Skills</p> <ul style="list-style-type: none"> • Using models to represent the abstract and evaluating the strengths and limitations • Drawing scientifically and labelling appropriately • Writing scientifically to explain 	<p>Application of knowledge to 'unknown' substances to determine the type of bonding and the likely properties of these substances</p> <p>Independent research project on the use of polymers in real world applications, the advantages, disadvantages and possible alternatives.</p> <p>Independent research on nanoparticles including definition, applications and advantages and disadvantages of this technology.</p> <p>Independent project that summarises the uses of carbon, the bonding in its various structural forms, the applications, advantages and disadvantages</p> <p>Independent selection of materials and construction of models to show various type of bonding or structure</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 9 GCSE Physics P 1 Energy and Energy Resources

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Energy is transferred but not created or destroyed</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • List the types of energy including energy stores and potential energy • Work done, potential energy kinetic energy and power equations <p>Understanding</p> <ul style="list-style-type: none"> • Explain how energy can be wasted if not destroyed or 'used up' and conserved in closed systems • Explanation of how work done can be reduced and / or energy transfer can be more efficient • Evaluate the methods to improve energy efficiency • Calculate gravitational potential, elastic potential or kinetic energy. • Explain the connection between energy and power <p>Skills</p>	<p>Confident in using and re-arranging equations to solve problems</p> <p>Deriving equations through deep understanding of how the components interact e.g. weight, height and gravitational potential energy.</p> <p>Completing multi-step calculations</p> <p>Extended scientific writing evaluating the methods of reducing energy waste</p> <p>Individually planning and possible conducting practical that could prove the connections in an equation.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 9 GCSE Physics P2 Energy Transfer By Heating

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Transfer of heat energy via conduction and specific heat capacity</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Heat can be transferred through a substance by conduction • Definition of specific heat capacity, insulators and conductors • Equation to calculate specific heat capacity <p>Understanding</p> <ul style="list-style-type: none"> • Explanation of how heat energy is transferred by conduction and therefore why some materials are better conductors / insulators • Calculation of specific heat capacity and use of the equation to explain real world examples of this (swimming pools) • Evaluation (including cost analysis) of heating and insulating buildings. <p>Skills</p>	<p>Independent study on the absorption and emission of infrared radiation.</p> <p>Model home / ice box cooler in which material selection has been justified to ensure insulation.</p> <p>Independent practical planning (and/or investigation) into real life application of insulators e.g. sleeping bags / duvet tog ratings.</p> <p>Confident in re-arranging the equation to perform necessary calculations ensuring appropriate units and conversion of units where needed.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 9 GCSE Physics P3 Energy Resources

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The supply and demand of electrical energy</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • List several methods of generating electricity • List some advantages and disadvantages of each method of generating electricity • Define renewable, non-renewable, carbon-neutral <p>Understanding</p> <ul style="list-style-type: none"> • Describe the sequence of generating electricity for a number of methods (identify what they all have in common) • Evaluate method of generating electricity (also considering the methods versatility in always meeting energy demands and cost) • Select methods of generating electricity most appropriate to given situation and justify answers <p>Skills</p>	<p>Understanding that the power of the wind is equal to V^3 through use of previously learnt equation on kinetic energy.</p> <p>Individual additional research into the topic to consider the effectiveness of case studies – wind farms off the East Coast of England for example.</p> <p>Model, design, built their own method of generating electricity and evaluate its usefulness as a source of electrical energy.</p> <p>Individual research project on the current energy providers, their charges and methods of generating electricity and justify which is currently the best provider.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 10 GCSE Biology B2 Cell Division

What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Knowledge</p> <ul style="list-style-type: none"> • State what is meant by the term mitosis • Define the term gametes • State the number of chromosomes in animal cells • State what is meant by cloning • Define stem cells and their uses • List arguments for and against use of stem cells <p>Understanding</p> <ul style="list-style-type: none"> • Explain each stage of the cell cycle including percentages • Explain why chromosomes are usually found in pairs • Describe the importance of cell differentiation in multicellular organism • Explain the use of tissue culture • Describe therapeutic cloning • Evaluate the use of stem cells in medicine and demonstrate a structured argument for or against <p>Skills</p> <ul style="list-style-type: none"> • Evaluate the model in terms of its strengths and limitations. • Calculate a simple percentages 	<p>Complete independent research on how stem cells are acquired and where they can be taken from</p> <p>Independently use math percentage skills to calculate the estimated time of each stage of the cell cycle</p> <p>Create a speech / information document detailing the ethical and religious reasons against the use of stem cells and counter argue this with the positives from a doctors point of view</p> <p>Suggest uses of tissue culture in the agricultural industry</p> <p>Evaluate the uses of stem cells for particular diseases</p> <p>Research an independent study on the process and uses of therapeutic cloning</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 10 GCSE Chemistry C1 Atomic Structure

What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Knowledge</p> <ul style="list-style-type: none"> • Structure of the atom • Key dates, scientists and developments in the history of the atom • Definitions of ions and isotopes • Methods in separating mixtures <p>Understanding</p> <ul style="list-style-type: none"> • How experiments have driven changed our understanding of atomic structure • Predict the ions formed from elements • Identify isotopes • Select appropriate methods of separating given mixtures <p>Skills</p> <ul style="list-style-type: none"> • Link a conclusion / investigation to the amendment of a scientific idea • Evaluate models used to explain the abstract • Confident use of symbols to represent elements and compounds 	<p>Application of knowledge to predict ion formations and begin to make the link between this and why only certain atoms bond together</p> <p>In depth understanding of the atomic mass number and how it can be a 0.5 value</p> <p>Extended scientific writing to describe the developments to the atomic model over time</p> <p>Justified reasoning of the separation method chosen and the strengths and limitations of each one</p> <p>Linking atomic structure to patterns previous explored in KS3 of the periodic table</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

GCSE Physics P4 Electrical Circuit

What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Knowledge</p> <ul style="list-style-type: none"> • Symbols to represent components in circuits and what they do • Recognise and be able to draw simple series and parallel circuits • Charge, potential difference and resistance calculations • Voltage, current and resistance – what they are and how to measure them • List factors that increase resistance <p>Understanding</p> <ul style="list-style-type: none"> • Comparison between voltage, current and resistance in series and parallel circuits • Design circuits to meet particular requirements or that are capable of performing certain functions <p>Skills</p> <ul style="list-style-type: none"> • Construct and interpret current-potential difference graphs • Calculate charge, potential difference and resistance. 	<p>Individual research project on static charge in which knowledge and understanding is demonstrated through small practical, every day examples of this</p> <p>Link to previous topic and understanding that those metals which delocalise more electrons are the better electrical conductors.</p> <p>Construction of complete circuits with minimal supervision and problem solving without teacher support</p> <p>Detailed model or analogy constructed which highlights the differences between series and parallel circuits in terms of current and voltage.</p> <p>Application of knowledge to a wide variety of circuits draw in difference ways.</p> <p>Confidence in completing multistep processes that may also require the re-arrangement of equations and / or conversions between units.</p>	<p>BBC Bitesize</p> <p>Doodle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 10 GCSE Physics P7 Radioactivity

What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Knowledge</p> <ul style="list-style-type: none"> • Describe types of radiation, alpha, beta and gamma • Be able to list properties of different types of radiation • Define half life • Give some uses of radiative substances • List the safety precaution that should be taken when dealing with radioactive substances <p>Understanding</p> <ul style="list-style-type: none"> • Link the structure of the radiation to its properties and uses • Evaluate whether the benefits of radioactive substances outweigh the associated risks (e.g. use of nuclear power stations and medicine) • Link properties of radiation and half-life to evaluate the danger of a given radioactive substance • Explain how the Rutherford scattering experiment led to the development of the atomic structure <p>Skills</p> <ul style="list-style-type: none"> • Use of symbols in chemical equations to predict reactants/products 	<p>Being able to link and relate several ideas together in order to determine the appropriate hazard of a given radioactive material.</p> <p>Own research project on the use of radioactive substances (such as Chernobyl) and considering the social, economic and environment impact of its use before and after a meltdown</p> <p>Detail timeline and description of how scientific experiments have changed our understanding of atomic structure over time including consideration of how these ideas came to be accepted as scientific truths.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

- | | | |
|---|--|--|
| <ul style="list-style-type: none">• Compare: describe the similarities and/or differences between things• Suggest: apply knowledge and understanding to a new situation. | | |
|---|--|--|

Year 10 GCSE Physics P12 Wave Properties

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The types of waves and how they behave.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • List properties of all waves • Know the names of wave types such as transverse, longitudinal, mechanical and electromagnetic. • Identify amplitude, wavelength, compressions, rarefaction, on wave diagrams <p>Understanding</p> <ul style="list-style-type: none"> • Compare the similarities and differences between different types of waves • Relate structure of waves to the energy that is delivered • Apply wave equation to calculate missing values • Construct scientific diagrams to show reflection and refraction and explain these wave behaviours <p>Skills</p> <ul style="list-style-type: none"> • Write a detailed method which clearly identifies variables • Identify causes of uncertainty and calculate this mathematically • Use a model to represent the abstract • Apply mathematical principle of standard form to convert numbers and use standard form in multiplications and divisions. 	<p>Detailed comparison of the properties of difference waves and how these relate to their function and behaviour.</p> <p>Detailed topic links to radioactivity and electromagnetic wave topics – sound and light topics from KS3</p> <p>Confident use of standard form to use very large and very small numbers in equations</p> <p>Manipulation of wave properties find solutions to unseen problems, such as reflection maze, ensuring a signal is reached in a mountainous area.</p> <p>Individual research on how diffraction of waves is overcome to ensure communication services across the nation</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 10 GCSE Biology B5 Communicable Disease

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The difference between non communicable disease and communicable diseases – and which pathogens cause communicable diseases. How these pathogens cause disease and how it is spread, and prevented by society and our human bodies.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Identify the difference between non communicable and communicable disease • Identify the main pathogens that cause communicable diseases • State how these pathogens are spread • Identify ways to prevent the spread of infections • Identify diseases caused by viruses, bacteria, fungus and protists • State the ways white blood cells protect the human body from infection <p>Understanding</p> <ul style="list-style-type: none"> • Suggests links between lifestyle and health • Explaining how pathogens are spread and using this to identify ways to stop the spread of infection • Explain why viral infections are harder to treat than bacterial infections • Explain how plant diseases can spread • Suggest why it is expensive to stop the spread of malaria • Explain the use of antibody production by white blood cells and how this helps to fight infection <p>Skills</p> <ul style="list-style-type: none"> • Draw a detailed conclusions that consider the interaction between two data sets • Appropriate line of best fit is drawn • Evaluate whether the data is sufficient to decide if the hypothesis is supported. (considering validity) 	<p>Using WHO information and website – create a speech detailing how infections can be spread from country to country</p> <p>Evaluate the use of different treatments for each pathogen and identify the effectiveness of these treatments</p> <p>Use the information on malaria to create an information leaflet for people travelling to countries that contain infected mosquitoes</p> <p>Confidently explain the use of white blood cells in fighting infections</p> <p>Research the effect of having a compromised immune system will impact the chance of humans contracting diseases</p> <p>Suggesting effective ways to prevent infection linked specifically to each pathogen</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p> <p>World Health Organisation website</p> <p>NHS website</p>

	<ul style="list-style-type: none"> • Synthesis and evaluate a range of conclusions from secondary sources to use in debate (considering validity) • Suggest: apply knowledge and understanding to a new situation • Calculate a simple percentages • Calculate a percentage increase or decrease 		
--	--	--	--

Year 10 GCSE Chemistry C2 The Periodic Table			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
History of the periodic table and how atomic structure can explain trends	<p>Knowledge</p> <ul style="list-style-type: none"> • Key dates, scientists and developments in the history of the periodic table • Trends of group 1, 7 <p>Understanding</p> <ul style="list-style-type: none"> • Applying knowledge of atomic structure to explain the trends shown in the periodic table and predict the behaviour of 'unknown' atoms <p>Skills</p> <ul style="list-style-type: none"> • Make predictions using scientific knowledge and understanding • Drawing conclusions from data • Link a conclusion / investigation to the amendment of a scientific idea 	<p>Extended scientific writing that explains the trends shown in the periodic table in relation to their atomic structure.</p> <p>Effective and throughout use of data when drawing conclusions</p> <p>Independent research to expand on the history of the periodic table to include some of the more recently discovered elements</p> <p>Ability to create their own periodic table from the data they are given about each element and compare to the modern version.</p> <p>Extending thoughts to other groups in the periodic table to explain reactivity of the noble gases or question the reactivity of transition and group 4 elements</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 10 GCSE Chemistry C3 Structure and Bonding

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The structure of compounds, simple molecules and giant structures from the atomic level and their properties</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Three types of bonding to join two elements together • Names of giant structures and list their properties • Definition, properties and uses of fullerenes • The different products carbon can form <p>Understanding</p> <ul style="list-style-type: none"> • Explain why two elements should react together based on knowledge of atomic structure • Which types of elements experience which bonding and explanation of how the bonding takes place through either shared, delocalised or exchange of electrons • Explanation of the properties based on the bonding within the structure <p>Skills</p> <ul style="list-style-type: none"> • Using models to represent the abstract and evaluating the strengths and limitations • Drawing scientifically and labelling appropriately • Writing scientifically to explain 	<p>Application of knowledge to 'unknown' substances to determine the type of bonding and the likely properties of these substances</p> <p>Independent research project on the use of polymers in real world applications, the advantages, disadvantages and possible alternatives.</p> <p>Independent research on nanoparticles including definition, applications and advantages and disadvantages of this technology.</p> <p>Independent project that summarises the uses of carbon, the bonding in its various structural forms, the applications, advantages and disadvantages</p> <p>Independent selection of materials and construction of models to show various type of bonding or structure</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 10 GCSE Physics P5 Electricity in the Home

What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Knowledge</p> <ul style="list-style-type: none"> • Components of the national grid • Components of a plug • Power and charge calculations • Appliances often have energy efficiency ratings <p>Understanding</p> <ul style="list-style-type: none"> • Explanation for the need of step up and step down transformers • Explanation of the safety features in all UK plugs • Comparison between alternating and direct current • Calculation of power and charge • Explanation of the energy transfers in a circuit • Evaluation of appliance efficiency. <p>Skills</p>	<p>A comparison between UK plugs and those around the world – what safety features may be different, why and the potential consequences of this.</p> <p>Extended scientific writing on the safety features of plugs with a labelled diagram</p> <p>Links to previous topics of energy transfers to show the energy transfers in a circuit and to calculate wasted energy and efficiency when given the appropriate data</p> <p>Confidence in completing multistep processes that may also require the re-arrangement of equations and / or conversions between units.</p> <p>Independent research into the charge of an electron and how many pass through a wire when the current is 1A.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Chemistry C3 Structure and Bonding

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The structure of compounds, simple molecules and giant structures from the atomic level and their properties</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Three types of bonding to join two elements together • Names of giant structures and list their properties • Definition, properties and uses of fullerenes • The different products carbon can form <p>Understanding</p> <ul style="list-style-type: none"> • Explain why two elements should react together based on knowledge of atomic structure • Which types of elements experience which bonding and explanation of how the bonding takes place through either shared, delocalised or exchange of electrons • Explanation of the properties based on the bonding within the structure <p>Skills</p> <ul style="list-style-type: none"> • Using models to represent the abstract and evaluating the strengths and limitations • Drawing scientifically and labelling appropriately • Writing scientifically to explain 	<p>Application of knowledge to 'unknown' substances to determine the type of bonding and the likely properties of these substances</p> <p>Independent research project on the use of polymers in real world applications, the advantages, disadvantages and possible alternatives.</p> <p>Independent research on nanoparticles including definition, applications and advantages and disadvantages of this technology.</p> <p>Independent project that summarises the uses of carbon, the bonding in its various structural forms, the applications, advantages and disadvantages</p> <p>Independent selection of materials and construction of models to show various type of bonding or structure</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 11 GCSE Physics P4 Electrical Circuit

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>What electricity is and how can we use it.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Symbols to represent components in circuits and what they do • Recognise and be able to draw simple series and parallel circuits • Charge, potential difference and resistance calculations • Voltage, current and resistance – what they are and how to measure them • List factors that increase resistance <p>Understanding</p> <ul style="list-style-type: none"> • Comparison between voltage, current and resistance in series and parallel circuits • Design circuits to meet particular requirements or that are capable of performing certain functions <p>Skills</p> <ul style="list-style-type: none"> • Construct and interpret current-potential difference graphs • Calculate charge, potential difference and resistance. 	<p>Individual research project on static charge in which knowledge and understanding is demonstrated through small practical, every day examples of this</p> <p>Link to previous topic and understanding that those metals which delocalise more electrons are the better electrical conductors.</p> <p>Construction of complete circuits with minimal supervision and problem solving without teacher support</p> <p>Detailed model or analogy constructed which highlights the differences between series and parallel circuits in terms of current and voltage.</p> <p>Application of knowledge to a wide variety of circuits draw in difference ways.</p> <p>Confidence in completing multistep processes that may also require the re-arrangement of equations and / or conversions between units.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Physics P5 Electricity in the Home

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>How electricity from power stations reaches and is used in our homes</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Components of the national grid • Components of a plug • Power and charge calculations • Appliances often have energy efficiency ratings <p>Understanding</p> <ul style="list-style-type: none"> • Explanation for the need of step up and step down transformers • Explanation of the safety features in all UK plugs • Comparison between alternating and direct current • Calculation of power and charge • Explanation of the energy transfers in a circuit • Evaluation of appliance efficiency. <p>Skills</p>	<p>A comparison between UK plugs and those around the world – what safety features may be different, why and the potential consequences of this.</p> <p>Extended scientific writing on the safety features of plugs with a labelled diagram</p> <p>Links to previous topics of energy transfers to show the energy transfers in a circuit and to calculate wasted energy and efficiency when given the appropriate data</p> <p>Confidence in completing multistep processes that may also require the re-arrangement of equations and / or conversions between units.</p> <p>Independent research into the charge of an electron and how many pass through a wire when the current is 1A.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Physics P12 Wave Properties

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The types of waves and how they behave.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • List properties of all waves • Know the names of wave types such as transverse, longitudinal, mechanical and electromagnetic. • Identify amplitude, wavelength, compressions, rarefaction, on wave diagrams <p>Understanding</p> <ul style="list-style-type: none"> • Compare the similarities and differences between different types of waves • Relate structure of waves to the energy that is delivered • Apply wave equation to calculate missing values • Construct scientific diagrams to show reflection and refraction and explain these wave behaviours <p>Skills</p> <ul style="list-style-type: none"> • Write a detailed method which clearly identifies variables • Identify causes of uncertainty and calculate this mathematically • Use a model to represent the abstract • Apply mathematical principle of standard form to convert numbers and use standard form in multiplications and divisions. 	<p>Detailed comparison of the properties of difference waves and how these relate to their function and behaviour.</p> <p>Detailed topic links to radioactivity and electromagnetic wave topics – sound and light topics from KS3</p> <p>Confident use of standard form to use very large and very small numbers in equations</p> <p>Manipulation of wave properties find solutions to unseen problems, such as reflection maze, ensuring a signal is reached in a mountainous area.</p> <p>Individual research on how diffraction of waves is overcome to ensure communication services across the nation</p>	<p>BBC Bitesize</p> <p>Doodle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Biology B2 Cell Division

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>How the process of cell division creates an organism in animals and plants; understand the term stem cell and the dilemmas involved in their use</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • State what is meant by the term mitosis • Define the term gametes • State the number of chromosomes in animal cells • State what is meant by cloning • Define stem cells and their uses • List arguments for and against use of stem cells <p>Understanding</p> <ul style="list-style-type: none"> • Explain each stage of the cell cycle including percentages • Explain why chromosomes are usually found in pairs • Describe the importance of cell differentiation in multicellular organism • Explain the use of tissue culture • Describe therapeutic cloning • Evaluate the use of stem cells in medicine and demonstrate a structured argument for or against <p>Skills</p> <ul style="list-style-type: none"> • Evaluate the model in terms of its strengths and limitations. • Calculate a simple percentages 	<p>Complete independent research on how stem cells are acquired and where they can be taken from</p> <p>Independently use math percentage skills to calculate the estimated time of each stage of the cell cycle</p> <p>Create a speech / information document detailing the ethical and religious reasons against the use of stem cells and counter argue this with the positives from a doctors point of view</p> <p>Suggest uses of tissue culture in the agricultural industry</p> <p>Evaluate the uses of stem cells for particular diseases</p> <p>Research an independent study on the process and uses of therapeutic cloning</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Biology B13: Reproduction

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>The inheritance of characteristics as a result of different types of reproduction</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Two types of reproduction, sexual and asexual • Structure of genes as the unit of inheritance • List some genetic disorders and some key facts about them • Key terminology including, gene, DNA, heterozygous, homozygous, dominant and recessive <p>Understanding</p> <ul style="list-style-type: none"> • Compare the advantages and disadvantages to organisms who use either type of reproduction • How sexual reproduction, the production of gametes via meiosis gives rise to variation in offspring • Use a punnett square to consider the likelihood of a genetic illness being passed onto the offspring. • Discuss the ethical implications of embryo screening <p>Skills</p> <ul style="list-style-type: none"> • Evaluate the effectiveness of models in modelling DNA and inheritance 	<p>Justified statements that agree or disagree with the use of genetic screening that consider the social, moral and economical sides of the debate</p> <p>Interpretation of complex family genetic inheritance trees containing three or more generations to determine the genotype of ancestors.</p> <p>Extended study into A Level, the structure of DNA as base pairs of nucleotides connected by sugar phosphate backbone</p> <p>Own independent research into a genetic disorder that hasn't been studied in class.</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 11 GCSE Chemistry C1 Atomic Structure

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Atomic structure and Separating mixtures</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Structure of the atom • Key dates, scientists and developments in the history of the atom • Definitions of ions and isotopes • Methods in separating mixtures <p>Understanding</p> <ul style="list-style-type: none"> • How experiments have driven changed our understanding of atomic structure • Predict the ions formed from elements • Identify isotopes • Select appropriate methods of separating given mixtures <p>Skills</p> <ul style="list-style-type: none"> • Link a conclusion / investigation to the amendment of a scientific idea • Evaluate models used to explain the abstract • Confident use of symbols to represent elements and compounds 	<p>Application of knowledge to predict ion formations and begin to make the link between this and why only certain atoms bond together</p> <p>In depth understanding of the atomic mass number and how it can be a 0.5 value</p> <p>Extended scientific writing to describe the developments to the atomic model over time</p> <p>Justified reasoning of the separation method chosen and the strengths and limitations of each one</p> <p>Linking atomic structure to patterns previous explored in KS3 of the periodic table</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: ‘Free science lessons’</p> <p>Seneca learning platform</p>

Year 11 GCSE Chemistry C2 The Periodic Table

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>History of the periodic table and how atomic structure can explain trends</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Key dates, scientists and developments in the history of the periodic table • Trends of group 1, 7 <p>Understanding</p> <ul style="list-style-type: none"> • Applying knowledge of atomic structure to explain the trends shown in the periodic table and predict the behaviour of 'unknown' atoms <p>Skills</p> <ul style="list-style-type: none"> • Make predictions using scientific knowledge and understanding • Drawing conclusions from data • Link a conclusion / investigation to the amendment of a scientific idea 	<p>Extended scientific writing that explains the trends shown in the periodic table in relation to their atomic structure.</p> <p>Effective and throughout use of data when drawing conclusions</p> <p>Independent research to expand on the history of the periodic table to include some of the more recently discovered elements</p> <p>Ability to create their own periodic table from the data they are given about each element and compare to the modern version.</p> <p>Extending thoughts to other groups in the periodic table to explain reactivity of the noble gases or question the reactivity of transition and group 4 elements</p>	<p>BBC Bitesize</p> <p>Doddle – power points and quick quizzes</p> <p>You tube: 'Free science lessons'</p> <p>Seneca learning platform</p>

Year 12 Autumn Term 1

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>Biological molecules Nucleic acids Cells structure</p>	<p>Knowledge & understanding</p> <ul style="list-style-type: none"> • Describe the tests for starch, a reducing and non-reducing sugar in detail. • Explain what is meant by qualitative testing. • Identify common monosaccharides. • Describe the monosaccharides from which lactose, maltose and sucrose are made. • Explain what is meant by a glycosidic bond and how they form through condensation. • Describe how polymerisation of α-glucose can form starch or glycogen • Explain how triglycerides form. <p>Recognise, from diagrams, saturated and unsaturated fatty acids</p> <ul style="list-style-type: none"> • Explain the variety of functions that proteins have and why they are so important to the body. • Explain the significance of DNA to organisms. 	<ul style="list-style-type: none"> • Independently follow instructions to test samples for starch, lipids and proteins. • Confident use of graph skills and drawing tangents to identify rate of reaction of enzymes • A structured and well planned investigation into the rate of enzymes – practical carried out safely and effectively • Exploring how to use chemical reagents to test a range of food samples – use hypothesise to predict results • Analyse results of food tests and write valid conclusion. • Research on enzyme activity and presenting findings. • Write an essay comparing and contrasting light and electron microscope. • Produce a guide to the prokaryotic cells and how they differ from eukaryotic ones. 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402</p> <p>https://www.physicsandmathstutor.com/biology-revision/</p> <p>https://www.khanacademy.org</p> <p>https://www.s-cool.co.uk/a-level/biology</p> <p>https://studywise.co.uk/a-level-revision/biology/www</p> <p>http://www.senecalearning.com login</p>

	<ul style="list-style-type: none">• Describe the structure of DNA and identify structural components from diagrams.• Describe the structural differences between prokaryotic and eukaryotic cells.• Explain the role of plasmids, capsules and flagella. <p>Skills</p> <ul style="list-style-type: none">• Interpret the results of qualitative tests• Interpret experimental techniques for biochemical tests independently• Risk assessment of dangers and appropriate control measures, using hazcards• Interpret evidence to make judgements and reach conclusions from Benedict's test.• Use appropriate apparatus, including data loggers, to record quantitative measurements such as temperature and pH• Design an experiment, based on research, to test a hypothesis		
--	--	--	--

	<ul style="list-style-type: none"> • Identify key variables which influence enzyme-controlled reactions • Present experimental data using tables and graphs • Calculate/work out initial rates of reaction from data and from slopes of a tangent • Interpreting DNA sequence and applying knowledge to work out complementary mRNA code. • Convert between units eg mm and μm • Use and manipulate the magnification formula • Use iodine in potassium iodide solution to identify starch grains in plant cells under a microscope • Knowledge of the procedure of using a micrometer and graticule. 		
Year 12 Autumn Term 2			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
Transport across cell membranes Cell recognition and the immune system	<p>Knowledge & understanding</p> <ul style="list-style-type: none"> • Describe the arrangement of proteins, glycoproteins, glycolipids, phospholipids and cholesterol in the fluid mosaic model of membrane. 	<ul style="list-style-type: none"> • Design an experiment to investigate the effect of a named variable eg temperature or alcohol concentration on membrane permeability. This could include: 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402</p> <p>https://www.physicsandmathstutor.com/biology-revision/</p> <p>https://www.khanacademy.org</p> <p>https://www.s-cool.co.uk/a-level/biology</p>

	<ul style="list-style-type: none"> • Explain the roles/importance of the constituent parts of the membrane. • Relate the structure of the membrane to its role around/inside cells. • Explain the movement of water due to osmosis into or out of cells. • Explain what a dilution series is and produce one from stock solutions. • Explain how surface area, number of channel or carrier proteins and differences in gradients of concentration or water potential affect the rate of movement across cell membrane. • Describe the adaptations of small intestine epithelial cells for absorption. • Define what is meant by co-transport. • Explain the process of co-transport in the context of absorption of glucose (and amino acids). • Explain why antigen recognition is important for the immune system. • Describe the process of phagocytosis. • Explain what is meant by the specific immune response. 	<ul style="list-style-type: none"> • Work through key aspects of experimental design eg key variables confidently. • Confident use of graph skills and drawing calibration curves. • Research the modern focus on disease prevention using internet materials and why recent outbreaks eg avian and swine flu, have attracted such media focus. • Undertake internet research into applications of monoclonal antibodies eg ADEPT, ELISA, magic bullets. 	<p>https://studywise.co.uk/a-level-revision/biology/www</p> <p>http://www.senecalearning.com login</p>
--	---	--	---

	<ul style="list-style-type: none">• Explain the cell-mediated (cellular) immune response.• Explain what is meant by a monoclonal antibody.• Explain the roles of plasma cells in producing a primary response and memory cells in producing a secondary response.• Describe the structure of a HIV particle• Explain how the structure of a HIV particle enables it to infect and replicate within a helper T cell • Skills • Use a colorimeter to record quantitative measurements• Design an experiment, based on research, to test a hypothesis• Identify key variables which affect membrane permeability• Plot the experimental data in an appropriate format• Evaluate data for errors and uncertainties• Understand how a colorimeter works and how to interpret results from colorimetry• Use and convert units for concentration		
--	--	--	--

	<ul style="list-style-type: none"> • Select (and use) an appropriate statistical test. • Application of knowledge to explain trends and to understand the technique of colorimetry 		
--	--	--	--

Curriculum Overview: *AS chemistry*

Year 12 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
3.1.1.1 Fundamental particles 3.1.2 Amount of substance 3.1.3.1 Ionic bonding 3.1.3.1 Ionic bonding 3.1.3.6 Bond polarity	Students should be able to: <ul style="list-style-type: none"> • Describe the structure of atoms in terms of protons, neutrons and electrons recall the relative mass and relative charge of protons, neutrons and electrons. • define atoms and ions in terms of numbers of protons, neutrons and electrons, as well as atomic number and mass number (including isotopes) • describe how a time of flight mass spectrometer works • identify elements and calculate relative atomic mass from mass spectroscopy data • find the relative formula mass of compounds from mass spectroscopy data. 	<ul style="list-style-type: none"> • Students research how the model of the atom changed over time • Evaluate how and why atomic structure model developed over time). • Students identify atoms and ions from numbers of protons, neutrons and electrons, and vice versa • Students determine the relative atomic mass of elements using isotope abundance data (this could include data for elements found in meteorites to show some difference) quoting answers to a suitable number of significant figures for data provided 	https://www.aqa.org.uk/subjects/science/as-and-a-level https://www.physicsandmathstutor.com http://www.senecalearning.com login http://www.docbrown.info http://www.chemsheets.co.uk/

		<ul style="list-style-type: none"> • Use an appropriate number of significant figures to find relative masses; • Find arithmetic means to find relative masses. • Students look at the mass spectra of compounds to determine the relative formula mass • Students investigate the use of mass spectroscopy in drug testing athletes 	
Year 12 Autumn Term 2			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
3.1.4.1 Enthalpy change 3.1.6.1 Chemical equilibria and Le Chatelier's principle 3.1.7 Oxidation, reduction and redox equations	<ul style="list-style-type: none"> • Define enthalpy change and standard conditions • define standard enthalpy changes of combustion and formation. • recall the equation $q = mc\Delta T$ • Calculate ΔH for reactions using calorimetry experiment data. • Recall the equation $q = mc\Delta T$ • Calculate ΔH for reactions using calirometry experiment data 	<ul style="list-style-type: none"> • Students list examples of endothermic and exothermic reactions (AO2 - Apply knowledge and understanding). • Students draw enthalpy profiles for exothermic and endothermic reactions (AO2 - Apply knowledge and understanding). <p>Write balanced chemical equations, to include state symbols, to represent the changes shown by standard enthalpy changes of formation and combustion (AO2 - Apply knowledge and understanding).</p>	https://www.aqa.org.uk/subjects/science/as-and-a-level https://www.physicsandmathstutor.com http://www.senecalearning.com login http://www.docbrown.info http://www.chemsheets.co.uk/

Curriculum Overview: *AS Physics*

Year 12 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>3.1.1 Use of SI units and their prefixes</p> <p>3.1.2 Limitation of physical measurements</p> <p>3.2.1.1 Constituents of the atom</p> <p>3.2.1.2 Stable and unstable nuclei</p>	<ul style="list-style-type: none"> • Students know that base units are needed in a system of measurement. • Students demonstrate that they can convert between different units of the same quantity, eg J and eV, J and kW h. • Students explain the difference between precision and accuracy. • Students explain the difference between repeatability and reproducibility. • Students can estimate uncertainties in measurements • Students are able to calculate percentage uncertainties from absolute uncertainties. • Students are able to combine absolute and percentage uncertainties. • Students can use error bars on graphs to 	<ul style="list-style-type: none"> • Present pictures of atomic models and ask students to identify the neutrons, protons and electrons. • Compare the charges and masses of protons, neutrons and electrons in SI and relative units. • Introduce specific charge and practice calculations involving the specific charges of protons and electrons and of nuclei and ions. • Review atomic number and nucleon number and practice using nuclide notation. • Review isotopes and practise analysing isotopic data to deduce neutron number. • Demonstration of knowledge of simple models of the atom. • Present masses in SI and relative units. • Substitute numerical values into algebraic equations to calculate specific charge. • Solve algebraic equations involving masses and charges of nuclei and ions. 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalearning.com login</p> <p>http://www.npl.co.uk/educate-explore/</p>

	estimate uncertainties in gradients and intercepts.	<ul style="list-style-type: none"> Demonstrate knowledge and understanding isotopes and analyse isotope data. 	
Year 12 Autumn Term 2			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
3.3.1.1 Progressive waves 3.4.1.1 Scalars and vectors	<ul style="list-style-type: none"> Define the terms frequency, period, amplitude and wavelength of a wave. Explain what is meant by phase and phase difference. Use the equation $c = f\lambda$ in calculations. Distinguish between longitudinal and transverse waves. Recognise that electromagnetic waves are transverse and all examples of electromagnetic waves travel at the same speed in a vacuum. Describe the polarisation of transverse waves. Describe applications of polarisers. Students can distinguish between scalar and vector quantities including velocity/speed, mass, 	<ul style="list-style-type: none"> Investigate the variation of the speed of a water wave with depth of water in a plastic tray. Measure the speed of sound in air. Use a spreadsheet to model the behaviour of a travelling wave using the full wave equation. Practise calculations to calculate frequencies, periods and wavelengths of waves. Demonstration of knowledge and understanding of the terms amplitude, frequency, period, wavelength, phase and phase difference. <p>Apply knowledge and understanding of the equation $c = f\lambda$ to calculate wavelengths and frequencies. Substitute numerical values into the wave equation.</p>	<p>https://www.aga.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalearning.com login</p> <p>http://www.npl.co.uk/educate-explore/</p>

	<p>force/weight, acceleration, displacement/distance.</p> <ul style="list-style-type: none"> • Students can add two vectors by constructing an appropriate scale drawing. • Calculate the sum of two vectors. • Resolve a vector into two perpendicular components. • Recognise the conditions for two or three coplanar forces acting at a point to be in equilibrium. • Apply the conditions for equilibrium in the context of an object at rest or moving at constant velocity. 		
--	---	--	--

Curriculum Overview: A2 Biology

Year 13 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
Energy Transfer-Photosynthesis Energy Transfer-Respiration Energy and ecosystems	<p>Knowledge and understanding</p> <ul style="list-style-type: none"> • Explain where, specifically, the light-dependent reaction occurs. • Explain the role of light in photolysis and photoionisation. 	<ul style="list-style-type: none"> • Provide a synopsis of Calvin's lollipop experiment, along with results from the chromatograms as to which substances were present at different times. • Draw a table comparing and contrasting aerobic and 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402</p> <p>https://www.physicsandmathstutor.com/biology-revision/</p> <p>https://www.khanacademy.org</p>

	<ul style="list-style-type: none"> • Explain how photoexcited electrons move along the electron transfer chain, and how ATP and reduced NADP are produced. • Explain chemiosmosis and the role of ATP synthase in producing ATP. • Learn how to design an experiment to investigate the effect of a named factor on the rate of the reaction catalysed by dehydrogenase. • Process data to calculate rates. • Represent raw and processed data clearly using tables and graphs. • Calculate an appropriate statistical test and interpret values in terms of probability and chance. • Evaluate the results conclusions. • Describe the process of anaerobic respiration in animals and some microorganisms. • Explain the advantage of producing ethanol or lactate using reduced NAD. • Compare and contrast aerobic and anaerobic respiration. <p>Skills</p>	<p>anaerobic respiration eg maximum number of ATP molecules generated.</p> <ul style="list-style-type: none"> • Design an experiment to investigate the effect of a named variable, eg temperature, on dehydrogenase activity in extracts of chloroplasts. This could include: <ul style="list-style-type: none"> • Researching and designing a suitable method • Risk assessment • Carrying out • Processing and presentation of data • Selection and use of appropriate statistical tests • Drawing conclusion and evaluating results. • Students could write an essay on the processes involved in aerobic respiration. 	<p>https://www.s-cool.co.uk/a-level/biology https://studywise.co.uk/a-level-revision/biology/www http://www.senecalearning.com login</p>
--	--	---	--

	<ul style="list-style-type: none"> • Apply knowledge of scientific techniques and interpret data to draw conclusions • Select (and use) an appropriate statistical test • Transfer information between tables and graphs, and plot 2 variables on a graph • Calculate rate or work out rate from the slope of a tangent to a curve • Evaluate data for errors and uncertainties, and consider margins of accuracy. • Devise and carry out experiments to investigate the effect of named variables on the rate of photosynthesis and respiration. • Determine the compensation 		
Year 13 Autumn Term 2			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
Response to stimuli Nervous Co-ordination Homeostasis	<p>Knowledge and understanding</p> <ul style="list-style-type: none"> • Explain the features of sensory reception which are common to all receptors. • Explain the stimulus which Pacinian corpuscles respond to. • Explain how a Pacinian corpuscle produces a generator potential in response to a specific stimulus. • Describe and explain the structure of a myelinated motor neurone. 	<ul style="list-style-type: none"> • Investigate the effect of IAA on root growth in seedlings. • Investigate the effect of a named variable, eg light intensity, on animal movement using a maze or choice chamber • Process and present data • Calculate and interpret stats test • Draw conclusion and evaluate results • Apply knowledge of kineses to draw and explain conclusions 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402</p> <p>https://www.physicsandmathstutor.com/biology-revision/</p> <p>https://www.khanacademy.org</p> <p>https://www.s-cool.co.uk/a-level/biology</p> <p>https://studywise.co.uk/a-level-revision/biology/www</p> <p>http://www.senecalearning.com login</p>

	<p>Explain what is meant by a resting and an action potential.</p> <ul style="list-style-type: none"> • Explain why it is important that core temperature, blood pH, blood glucose concentration and blood water potential are maintained within restricted limits and the consequences of not doing so. Explain the general stages involved in negative feedback, and why these are used in homeostatic mechanisms. • Explain what is meant by the terms glycogenesis, glycogenolysis and gluconeogenesis. Apply knowledge to explain the stages involved in negative feedback in response to changes in blood glucose concentration. <p>Skills</p> <ul style="list-style-type: none"> • Development of knowledge relating to IAA and tropisms in plants • Interpret scientific data and apply knowledge of the effects of IAA to explain it • Use/conversion of IAA concentrations in ordinary and standard form • Calculation of percentage inhibition/stimulation • Plot 2 variables from experimental data 	<ul style="list-style-type: none"> • Carry out the investigation as to how we see colour and apply knowledge to explain their findings. • Design and carry out an investigation into the effect of a named variable on pulse rate. 	
--	---	--	--

	<ul style="list-style-type: none"> Carry out investigations into the effect of IAA on root growth in seedlings. 		
--	--	--	--

Curriculum Overview: *A2 Chemistry*

Year 13 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>3.1.4 – Energetics Definitions of enthalpy changes used in Born–Haber and solution enthalpy cycles.</p> <p>3.1.8.2 Gibbs free-energy change ΔG and entropy change ΔS</p> <p>3.1.9.1 Rate equations Understand rate equations and order of reaction.</p> <p>3.1.9.2 Determination of rate equation Understand that rate equations have to be determined by experiment.</p> <p>3.1.6 – Chemical equilibria, Le Châtelier’s principle and K_c</p>	<ul style="list-style-type: none"> Define lattice enthalpy (formation and dissociation), enthalpy of formation, ionisation enthalpy, enthalpy of atomisation, bond enthalpy, electron affinity, enthalpy of solution, hydration enthalpy draw and use Born–Haber cycles to find missing values of enthalpy changes Comment on the covalent character of an ionic compound by comparing lattice enthalpies found using Born–Haber cycles with those calculated theoretically using the perfect ionic model. 	<ul style="list-style-type: none"> Write equations to represent enthalpy changes Construct Born-Haber cycles and use them to calculate missing enthalpy change values Compare and comment on values of enthalpy changes from Born–Haber cycles with those calculated theoretically using the perfect ionic model Analyse, interpret and evaluate data to make judgements. Construct and use cycles involving the solution of ionic compounds in water to find missing enthalpy change values Answer rich questions 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalearning.com login</p> <p>http://www.docbrown.info</p> <p>http://www.chemsheets.co.uk/</p>
Year 13 Autumn Term 2			

What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?
<p>3.1.11 Electrode potential and electrochemical cells</p> <p>3.2.4 Properties of Period 3 elements and their oxides</p>	<ul style="list-style-type: none"> • Understand that there is a potential difference between two half cells (electrodes) that are joined • use cell notation to represent cells • understand that potentials are measured relative to the Standard Hydrogen Electrode • understand that the potential of an electrode is affected by conditions • know the standard conditions under which potentials are measured <p>know that electrode potential are listed in order in the electrochemical</p>	<ul style="list-style-type: none"> • Students make cells and use them to measure EMF and unknown electrode potentials Solve problems set in practical contexts; AT j - Set up electrochemical cells and measuring voltages). • Students write the standard cell notation for cells • Students predict how changes in conditions will affect EMF • Students could plan and carry out an experiment to investigate the effect of changing conditions, such as concentration or temperature, in a voltaic cell such as $Zn Zn^{2+} Cu^{2+} Cu$ (AO2 - - Solve problems set in practical contexts; • Identify variables including those that must be controlled; • Students could use E values to predict the direction of simple redox reactions, then test these predictions by simple test-tube reactions 	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalarning.com login</p> <p>http://www.docbrown.info</p> <p>http://www.chemsheets.co.uk/</p>

Curriculum Overview: *A2 Physics*

Year 13 Autumn Term 1			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?

<p>3.6.1.1 Circular motion 3.6.1.3 Simple harmonic systems 3.6.1.4 Forced vibrations and resonance 3.6.2.1 Thermal energy transfer</p>	<p>Motion in a circular path at Understand and explain why circular motion is an accelerated motion and needs a centripetal force.</p> <p>Recall and use equations $\omega = v/r = 2\pi f$, $a = v^2/r = \omega^2 r$, $F = mv^2/r = m\omega^2 r$, to solve circular motion problems.</p> <p>Use radian as a measure of angle and convert between radians and degrees Identify and calculate centripetal forces in contexts such as a mass whirled on a string and a car rounding a bend. Recall the condition for SHM : $a \propto -x$</p> <p>Solve problems using the equations of SHM :</p> $x = A \cos(\omega t) \text{ and } v = \pm \omega \sqrt{A^2 - x^2}$ $v_{max} = \omega A$ $a_{max} = \omega^2 A$ <p>Recognise and use the concept of the gradient of the $x - t$ graph leading to the $v - t$ graph, and the gradient of the $v - t$ graph leading to the $a - t$ for SHM structure and support students should be able to derive the equations for mass-spring and simple pendulum.</p>	<p>Discussion and demonstration of circular motion, for example stone/bucket of water on a string, helium balloon in car.</p> <p>Demonstrate knowledge and understanding of circular motion as an accelerated motion AO2: Apply knowledge and understanding of forces to identify and calculate centripetal forces.</p> <p>Use methods to increase accuracy of measurements, such as timing over multiple rotations in circular motion experiment.</p> <p>Apply knowledge and understanding of forces to identify and calculate centripetal forces.</p> <p>Use methods to increase accuracy of measurements, such as timing over multiple rotations in circular motion experiment.</p>	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalarning.com login</p> <p>http://www.npl.co.uk/educate-explore/</p>
--	---	--	---

	<p>Use the mass-spring and pendulum equations to solve SHM problems.</p> <p>Recognise other harmonic oscillators and apply knowledge and understanding of mass-spring and pendulum to solve problems in different contexts.</p> <p>Describe the energy changes that take place in SHM and sketch graphs of variation of E_k, E_p and total energy with displacement and time.</p>		
Year 13 Autumn Term 2			
What are we learning?	What knowledge, understanding and skills will we gain?	What does excellence look like?	What additional resources are available?

<p>3.7.2 Gravitational fields</p> <p><i>3.7.2.1 Newton's law</i></p>	<p>Understand that gravity is a force that acts between all matter, is always attractive and is a vector quantity.</p> <p>Calculate the force between masses using Newton's Law of gravitation concept of a force field.</p> <p>Sketch gravitational fields around objects and near the surface of the Earth.</p> <p>Recall the definition of gravitational field strength and use the gravitational field strength equations,</p> $g = \frac{F}{m}$ $g = \frac{GM}{r^2}$	<p>Demonstration of magnetic field pattern around a bar magnet with iron filings. Students plot field lines with a compass.</p> <p>Discuss how field line model can be used to draw gravitational fields. Students draw gravitational fields around masses and close to the surface of the Earth.</p> <p>Define gravitational field strength and rehearsal of calculations using $g = F / m$ and $g = GM/r^2$</p> <p>Demonstrate knowledge and understanding of the concept of gravitational fields.</p> <p>Apply knowledge and understanding of gravitational field strength to solve problems in different contexts.</p>	<p>https://www.aqa.org.uk/subjects/science/as-and-a-level</p> <p>https://www.physicsandmathstutor.com</p> <p>http://www.senecalearning.com login</p> <p>http://www.npl.co.uk/educate-explore/</p>
---	---	--	---