

| Topic | What will I learn? | How will I learn it? | Why is it important that I learn this? | Why am I learning this now? |
|---|---|---|---|--|
| Year 9 – Term 1 | | | | |
| <i>Biology Topic 1 Cells</i> | <p>The structure of prokaryotic and eukaryotic cells including plant, animal and bacterial cells</p> <p>Explain how the structure of different types of cell relates to their functions</p> <p>To understand how substances enter and leave cells and to calculate surface area to volume ratios</p> <p>To safely use a microscope to magnify and focus images of cells</p> | <p>Through independent learning and enquiry</p> <p>Through the application of new knowledge and skills to unfamiliar contexts in exam style questions</p> <p>Through the use of scientific modelling</p> <p>Through practical based work to investigate and observe the structure of cells using microscopes and work safely.</p> | <p>To understand the importance of different types of cells in organisms</p> <p>To appreciate how surface area to volume ratio affects rate of diffusion and impacts on organisms</p> <p>To be able to work safely preparing and using Biology samples and microscopes.</p> | <p>This unit will build on your knowledge of cells from Year 7 and introduce you to new cell structures and cell types.</p> <p>The use of microscopes will directly link to work you will do in year 10 looking at these in more depth</p> <p>Students who go onto A-Level Biology will further explore the structure of cells</p> |
| <i>Chemistryu Topic 1 Basic Chemistry</i> | <p>You will develop a deeper knowledge and understanding of atoms, elements, compounds and mixtures.</p> <p>You will learn to represent chemical reactions using formulae and equations</p> <p>You will expand your knowledge of simple techniques to</p> | <p>Through teacher input and demonstration.</p> <p>Through practical work and data analysis with an emphasis on chromatography.</p> <p>Through independent learning and research.</p> <p>Through the making and use of revision resources to conclude the topic.</p> | <p>The concepts studied at the start of year 9 are the basis for all further study in Chemistry.</p> | <p>This topic builds on the work in Year 7 looking at pure substances and separating mixtures.</p> <p>This topic also prepares you for the practical work you will carry out throughout the GCSE Chemistry course.</p> |

| | | | | |
|--|--|--|---|--|
| | separate mixtures. | | | |
| <p><u>Physics Topic</u> <u>1:</u> <i>Energy</i></p> | <p>You will learn about energy stores and transfers in the laboratory and in the world around us.</p> <p>You will learn to calculate the amount of energy an elastic, moving or high up object has.</p> <p>You will learn about work and power, and be able to calculate them using and rearranging an equation.</p> <p>You will learn how thermal energy is transferred in different states of matter and how to reduce unwanted transfers.</p> | <p>Planning and completing investigations</p> <p>Teacher input and demonstration</p> <p>Independent learning and research</p> <p>Using scientific evidence to justify a choice</p> | <p>To be able to understand the differences between energy stores and appreciate how they relate to everyday life.</p> <p>To plan and carry out a range of investigations and to work safely.</p> <p>To be able to draw conclusions based on data and observations and to use evidence to justify ideas.</p> <p>To practice calculations and improve mathematical skills.</p> | <p>This builds on your work in KS3 when you looked at energy and the impact it has on our lives.</p> <p>This knowledge gained in this topic is essential going further into GCSE Physics as the equations used in this topic often appear in later topics. It is a fundamental requirement in A-level, that is expanded upon in more detail.</p> <p>It builds on skills learned in maths and helps to develop mathematical confidence, applying understanding to new concepts.</p> |

| | | | | |
|---|---|--|--|---|
| | <p>You will learn about efficiency and how to calculate and compare efficiencies of different machines.</p> | | | |
| <p><i>Chem Topic 2</i> <u>Atomic Structure</u></p> | <p>You will learn the basic structure of an atom and how the structure links to the periodic table.</p> <p>What an isotope is and how to calculate relative atomic mass.</p> <p>How scientific theories develop over time by studying different models of the atom.</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas about atoms.</p> <p>Through independent research and enquiry.</p> <p>Through the making and use of revision resources to conclude the topic.</p> | <p>To gain an appreciation of how scientific ideas and explanations develop over time as new evidence emerges.</p> <p>Knowledge of atomic structure is essential to our understanding of the properties and behaviour of different elements.</p> | <p>This learning builds on earlier study of the particle model of matter and the introduction to atoms and elements in in Year 7 and at the start of year 9.</p> <p>Knowledge of atomic structure is essential when you study topic C2 Structure and bonding and the process of electrolysis in unit C4 Chemical Changes.</p> |

| | | | | |
|---|---|--|--|---|
| <p><i>Biology Topic 2</i> <i>Photosynthesis</i></p> | <p>You will learn what photosynthesis is and factors that affect it.</p> <p>You will carry out an investigation into the effect of one of these factors on the rate of photosynthesis.</p> <p>You will look at the uses of glucose in plants and the importance of using greenhouses to enhance profit.</p> | <p>Through class discussion and debate.</p> <p>Through investigating how light intensity affects the rate of photosynthesis</p> <p>Through context based tasks.</p> <p>Through independent research and enquiry.</p> | <p>To develop a deeper knowledge and understanding of the importance of the survival and existence of plants to support animals.</p> | <p>You will build upon your work in KS2 and begin to use more advanced terminology.</p> <p>In this topic you will build on the work you did in year 8 and now start to look at what factors affect the rate of photosynthesis and investigate how this can be measured.</p> <p>Photosynthesis is an important chemical reaction that is carried out by plants. Understanding this process will help you in future learning, it is revisited all the way up to A level!</p> |
| <p><i>Year 9 Term 2</i></p> | | | | |
| <p><u>Physics Topic 2:</u> <i>Particle Model of Matter</i></p> | <p>You will compare the three states of matter (solid, liquid, gas) in terms of particle arrangement, movement and the bonds between particles.</p> <p>You will calculate the density of regular and irregular solids, and of liquids.</p> <p>An object's internal energy is the sum of the kinetic energy and potential energy of all the particles in the object.</p> | <p>Teacher input and demonstration.</p> <p>Investigations of heating and cooling.</p> <p>Required Practical:</p> <ul style="list-style-type: none"> • Density | <p>You will understand the difference between chemical changes and physical changes.</p> <p>You will begin to develop your scientific vocabulary with key terms used in practical investigations.</p> <p>You will gain a greater understanding of the conservation laws that govern our universe.</p> <p>You will develop your skills in the interpretation of graphs.</p> | <p>Since Y1 you have been classifying materials by their properties, and by Y5 you were identifying reversible and irreversible changes (for example changes of state such as freezing are reversible – ice cubes melt! – but chemical changes are irreversible – which is just as well, as you don't want table salt suddenly changing into other chemicals in your mouth!)</p> <p>In KS3 you learnt about the difference in density between states of matter, and that mass is conserved in physical changes. You also learnt how the movement and arrangement of particles</p> |

| | | | | |
|--|---|---|---|---|
| | <p>Heating an object increases either the kinetic energy of its particles OR the potential energy of its particles. This manifests as an increase in temperature OR a change of state.</p> | | | <p>changes when they are heated.</p> <p>If you continue to A Level, you will study Thermal Physics in more detail, and learn how the behaviour of atoms and molecules is governed by the rules of probability.</p> |
| <p><i>Biology Topic 3 Ecology</i></p> | <p>How everything in an environment is linked to form ecosystems</p> <p>How organisms are designed to survive in different conditions</p> <p>How to investigate the abundance and distribution of organisms</p> | <p>Through independent learning and enquiry</p> <p>Through the use of scientific modelling</p> <p>Through investigative work to gather data to support a hypothesis</p> <p>Through the application of new knowledge and skills to unfamiliar contexts in exam style questions</p> | <p>The idea of interdependence is crucial in the current climate emergency.</p> <p>Students can appreciate the impact of their actions on the wider environment</p> <p>To promote interest and curiosity in the variety of life on our planet</p> <p>To further develop investigative skills to collect accurate and valid data</p> | <p>Builds on prior knowledge of food webs and adaptations at KS2 with a focus now on explaining the patterns and knowledge</p> <p>Sampling investigations are required practical work which are examined on the GCSE assessments</p> <p>Students who go onto A-Level Biology will apply these sampling techniques in field work</p> <p>Cross curricular links to geography and the impacts of organisms on their environment and vice versa</p> |
| <p><u>Chem Topic 3 Periodic Table</u></p> | <p>To explain the difference between metals and non-metals in terms of atomic structure</p> <p>How the periodic table has changed over time</p> <p>How to use the Periodic Table to explain chemical</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas about atoms.</p> <p>Through practical work testing the reactivity of different metals.</p> | <p>The Periodic Table links to atomic structure and provides chemists with a structured organisation of all the known elements providing information on their physical and chemical properties.</p> | <p>Builds on prior knowledge of atoms and elements and links how reactions of elements are related to their electronic structure</p> <p>Knowledge of the elements in different groups of the periodic table is needed to help explain the chemical reactions and processes such as reactions of</p> |

| | | | | |
|---|---|---|--|---|
| | properties and patterns in reactivity through study of different groups of elements. | Through independent learning and research. Through the making and use of revision resources to conclude the topic. | Explains how testing a prediction can support or refute a new scientific idea. | metals and electrolysis studied in the GCSE course |
| <u>Year 9 Term 3</u> | | | | |
| <u>Physics Topic 3:</u> <i>Atomic Structure</i> | <p>You will learn about the history of the atom and the scientific models used to explain the results of experiments</p> <p>You will learn the basic structure of an atom including protons, electrons and neutrons.</p> <p>You will acquire knowledge of the properties of alpha particles, beta particles and gamma waves and apply it to decay equations</p> <p>Radioactive decay is random so it is not possible to predict which individual nucleus will decay next, but with a large enough number of nuclei it is possible to predict how many will decay in a</p> | <p>Through making models of atoms</p> <p>Through teacher input and demonstration – observing Alpha, Beta and Gamma particles</p> <p>Through experimental analysis and drawing and interpreting graphs – half life</p> <p>Through practical investigations by using dice to simulate the decay of a radioactive nuclide</p> <p>Apply mathematical concepts and calculate results</p> <p>Through using scientific evidence to justify a choice.</p> | <p>Apply mathematical concepts and calculate results</p> <p>Present observations and data using appropriate methods, including tables and graphs.</p> <p>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</p> <p>Use and derive simple equations and carry out appropriate calculations</p> <p>Build on problem solving skills by using practical equipment</p> | <p>This learning will build on previous learning topics from KS3 from the particle model of matter including; the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density.</p> <p>Understanding the structure and behaviour of atoms is fundamental to not just physics topics but all of the sciences.</p> <p>Realising the many uses of radiation will also give students ideas about future careers beyond school and A level.</p> |

| | | | | |
|--|---|--|---|--|
| | <p>certain amount of time.</p> <p>You will learn some of the many uses nuclear radiation has ranging from medicine to smoke alarms.</p> | | | |
| <i>Biology Topic 4 Environmental change</i> | <p>How human population growth and actions impact on biodiversity.</p> <p>How loss of biodiversity and global warming are linked</p> | <p>Through enquiry and comprehension.</p> <p>Through class discussion and debate.</p> <p>Through context based tasks.</p> <p>Through analysis of data and evaluation.</p> | <p>To develop scientific literacy specific to our changing planet and the impact humans are having.</p> <p>To evaluate individual and society pressures on the environment.</p> | <p>Building on work done on global warming in year 8 topic Gas tests and environmental problems, including global warming.</p> <p>Relates to Year 10 work on food security and biodiversity and year 11 work on natural and artificial selection in relation to food security.</p> |
| <u>Chemistry</u> <u>Topic 4</u> <u>Periodic Table</u> | <p>To explain the difference between metals and non-metals in terms of atomic structure</p> <p>How the periodic table has changed over time</p> <p>How to use the Periodic Table to explain chemical properties and patterns in reactivity through study of different groups of elements.</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas about atoms.</p> <p>Through practical work testing the reactivity of different metals.</p> <p>Through independent learning and research.</p> <p>Through the making and use of revision resources</p> | <p>The Periodic Table links to atomic structure and provides chemists with a structured organisation of all the known elements providing information on their physical and chemical properties.</p> <p>Explains how testing a prediction can support or refute a new scientific idea.</p> | <p>Builds on prior knowledge of atoms and elements and links how reactions of elements are related to their electronic structure</p> <p>Knowledge of the elements in different groups of the periodic table is needed to help explain the chemical reactions and processes such as reactions of metals and electrolysis studied in the GCSE course</p> |

| | | | | |
|---|---|---|--|--|
| | | to conclude the topic. | | |
| <u>Chemistry</u> <u>Topic 4</u> <u>Introduction to bonding</u> | <p>The basic information about the three different types of bonding and structures found in elements and compounds.</p> <p>An initial look at the properties that these different substances have and how their structure is related to their properties.</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas.</p> <p>By comparing different structures and how they relate their properties.</p> | <p>To know how the properties of different elements and compounds are related to their structure and why we use them for certain uses.</p> <p>To appreciate how scientists can use this knowledge to engineer new materials with desirable properties and for use in different technologies.</p> | <p>The bonding topic builds on the periodic table and the electronic structure that students have studied in Year 9.</p> <p>To prepare you for a deeper understanding of this topic when you study unit C2b in year 10 which relates bonding and structure to properties of materials.</p> <p>Cross-curricular links with Product Design</p> |
| <u>Chemistry</u> <u>Topic 5</u> <u>Chemistry of the atmosphere</u> | <p>How the atmosphere has developed over time and why these changes have taken place.</p> <p>About greenhouse gases, how human activity impact these and how this leads to global climate change.</p> <p>What is meant by carbon footprint and how to reduce it.</p> <p>Other atmospheric</p> | <p>Through group and class discussion and debate.</p> <p>Through independent learning and research.</p> <p>Through the application of knowledge to exam style questions.</p> | <p>To appreciate that the Earth's atmosphere is dynamic and forever changing. To understand the importance of the of the Chemistry of the atmosphere and how this can tell us information about history but can also be used to help predict weather and climate change.</p> <p>To understand how you yourself can have an impact on the</p> | <p>This topic will build on the work done in Year 8 on the Earth's atmosphere, the greenhouse effect and global warming.</p> <p>This topic also links to the GCSE Organic Chemistry topic looking at the combustion of fossil fuels.</p> <p>Cross-curricular links with Biology and Geography.</p> |

| | | | | |
|--|-------------------------------|--|--|--|
| | pollutants and their effects. | | environment and atmosphere and how to reduce the impact of human activity. | |
|--|-------------------------------|--|--|--|