	Autumn	Spring	Summer
Y7	**Cells & Organisation** **Particles** **Forces**	**Reproduction** **Separating Techniques** **Energy**	**Independence** **Chemical Reactions** **Electricity**
Curriculum content	**Cells & Organisation:** This topic will introduce the students to the structure of plant and animal cells, how to use a microscope and the adaptations of specialised cells. Student will also learn the Structure & function of muscular skeletal system. **Particles:** This topic explain the three states of matter and how changes of state occur. It will introduce the idea of diffusion and the factors that affect diffusion. **Forces:** This topic will introduce types of force and how they affect an object, Students will investigate the effects of friction, moments and Hooke's Law.	**Reproduction:** This topic will look at the structure & function of female and male sexual reproductive organs, puberty, the menstrual cycle and a female's body changes during pregnancy **Separating Techniques:** This topic will introduce Elements, Compounds and Mixtures. Students will experiment with various separation techniques and learn which factors affect how a substance dissolves. **Energy:** This topic will introduce students to type of energy store and transfer. It will explain why energy is sometimes wasted and investigate the energy stores in food.	**Independence:** This Topic will explain how animal and plants rely on each other for energy in a food chains/webs. It will describe the importance of insects in pollination and how humans impact food chains. **Chemical Reactions:** This topic will explain how chemical reactions from compounds. Students will investigate common Chemical reactions such as Thermal Decomposition and neutralisation. **Electricity:** This topic will introduce student to electrical circuits and the symbols used to draw them. Students will build circuits and describe the difference between Series and parrel circuits. Electrical safety and the design of a plug will also be taught.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in KS2		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and expected to speak and write like a Scientist.		

	Autumn	Spring	Summer
Y8	**Nutrition & Digestion** **Periodic Table** **Energy**	**Bioenergetics** **Chemical Reactions** **Magnetism**	**Genetics & Evolution** **Earth & The Atmosphere** **Sound** **Earth & Space**
Curriculum content	**Nutrition & Digestion:** In this topic students will learn the structure and function of the digestive system and how the food we eat provides us with all the nutrients we need to grow and survive. **Periodic Table:** This topic will introduce students the development of the periodic table. Students will investigate the properties of the different groups within the period table. **Energy:** In this topic students will understand how energy is transferred by conduction, Convection and radiation. It will introduce generation of electricity by non/renewable means.	**Bioenergetics:** This topic will explain the importance of respiration and photosynthesis. Students will be taught the structure and function of the respiratory and cardiovascular system and the effects of exercise on these systems. **Chemical Reactions:** In this topic students will learn about a wide range of chemical reactions. Including those involving neutralisation and those used to extract metals **Magnetism**: This topic will recap magnetism and magnetic fields. It will introduce electromagnetism and students will investigate the factors affecting the strength of an electromagnet.	**Genetics & Evolution:** This topic will introduce students to the structure of DNA and how variation arises. It will explain evolution and the factors that cause extinction. **Earth & The Atmosphere:** Students will discover how the atmosphere has changed over time, the impact humans are having on the atmosphere and the consequences of burning fossil fuels. **Sound:** Student will learn how sound waves are generated. Investigate the speed of sound and learn the structure of the ear. **Earth & Space: This** topic will introduce student to the wonders of the solar system. It will explain the seasons and the effect of gravity.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in Year 7		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a Scientist.		

	Autumn	Spring	Summer
Y9	**Cells & Organisation** **Atoms, Elements & Compounds** **Forces**	**Health & Disease, Ecology** **Chemical Energy** **Sustainable development** **Light** **Particles**	**Cells** **Atomic Structure** **Energy** **(Key Stage 4 Content)**
Curriculum content	**Cells & Organisation**: In this topic the structure and function of cell is recalled. The movement of substance into cells is introduced and students study body systems including the cardiovascular, nervous, digestive systems and the structure of a leaf. **Atoms,** Elements & Compounds: This topic explains the way in which bonds are formed between elements and how different bonds behave. It also covers purity and uses chromatography to investigate. **Forces:** This topic looks at the forces the affect speed and explains the forces that are exerted under pressure.	**Health & Disease:** The topic explains the differences between communicable and non-communicable diseases. Students study a range of disease caused by pathogens and also cover inherited disease and cancer. **Ecology:** This topic explains how organisms interact within an ecosystem. The resources they compete for and the adaptations they have to survive. **Chemical Energy:** This topics explains the factors that affect the rate of chemical reactions and endo/ Exo thermic reactions. **Sustainable development:** This topic looks at the uses of everyday materials such as plastics and ceramics and their impact on the environment. **Light**: This topic investigated the reflection and refraction of light and explains the structure and function of the eye. **Particles:** Students investigate how energy changes state and how to find the density of an object.	**Cells:** This topic recaps the structure and function of cells and introduces prokaryotic cells. Students investigate the transport of substance into and out of cells and the use of microscopes. **Atomic Structure:** This topic covers the structure of the atom and its subatomic particles. The development of the periodic table and the characteristics of the element in it groups **Energy:** This topic covers energy store and transfers. It introduces students to energy calculations Students investigate specific heat capacity, explain efficiency and how the different energy resources are used to produce electricity.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in Year eight.		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a Scientist.		

	Autumn	Spring	Summer
Y10 **Combined Science**	**Organisation** **Atomic Structure & Bonding** **Quantitative Chemistry** **Particles** **Atomic Structure (Physics)**	**Infection & Response** **Bioenergetics** **Chemical Changes** **Energy Changes** **Electricity**	**Homeostasis** **Rates of Reaction** **Chemical Analysis** **Waves**
Curriculum content	**Organisation:** Explains the structure and function of the digestive and cardiovascular system **Atomic Structure & Bonding:** Details the structure and properties of Ionic, Covalent and Metallic bonds **Quantitative** Chemistry: Explain how to calculate relative formula mass, percentage mass and concentration. **Particles.** Explains how energy affects particles and causes changes in state. Investigated specific heat capacity and latent heat of vaporisation. **Atomic Structure (Physics)** Describes the history of the atom and the type and properties of radioactivity. How radiation decays and its uses**.**	**Infection & Response** Explains how pathogens attack organisms and how they defend themselves. Includes vaccine and development of need drugs. **Bioenergetics:** How energy is exchanged in living organisms through the processes of respiration and photosynthesis. Investigates the factors that affect photosynthesis. **Chemical Changes:** Explains how the reactivity of metals is used to extract them from their ore. How acids and alkalis react to make salts and how electrolysis is used to separate substances. **Energy Changes** Explains how changes in bonds and energy can produce endothermic and exothermic reaction. **Electricity:** Explains how electricity is generated and travels through circuits to our homes. Investigates resistance.	**Homeostasis:** Explains how the nervous system and endocrine system maintain the same state within the body. **Rates of Reaction.** Describes the interactions between particles in a chemical reaction and the facts that affect rate of reaction. **Chemical Analysis:** Demonstrates a range of qualitative tests used by forensic and drug control scientists to identify gases, pure substances and formulation. **Waves: This** topic describes the types of waves and their properties, including electromagnetic waves Students investigate wave properties in liquids and solids
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. Student will complete a paper 1 Mock Exam in the Summer of this year. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in KS3		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a Scientist during questioning and deliberate practice.		

	Autumn	Spring	Summer
Y11 Combined Science	**Inheritance** **Organic Chemistry** **Forces**	**Ecology** **Using Resources** **Waves & Magnetism**	**Exam Preparation**
Curriculum content	**Inheritance:** This topic will explain how genetic inheritance creates unique offspring and how variation drives evolutionary change. It explains how mutation can cause disease and how humans use selective breeding **Organic Chemistry:** This topic explains the structure and properties of hydrocarbons and their importance to humans. It explains how humans have developed methods to make crude oil more useful. **Forces:** This Topic looks at forces and their interactions. It investigates the relationships between forces and those that affect speed and acceleration. Students are introduced to Newtons Laws.	**Ecology:** This topic covers the complex interactions between species in an ecosystem. How materials are cycled, and the threat humans pose to biodiversity **Using Resources:** This topic looks how humans use the earth resources including processing wastewater and water for drinking. It describes how the life cycle of the materials we use impacts the planet. **Waves:** This topic describes the types of waves and their properties, including electromagnetic waves Students investigate wave properties in liquids and solids **Magnetism:** This topic explains magnetism, the motor effect and how the strength of electromagnets can be altered.	**Exam Preparation:** This time will be used to recap content for all six papers. It will focus of areas identified from previous exam as being challenging. It will also focus on practical skills, extended response and exam technique.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. Student will complete two Mock Examinations in November and February of this year. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in Year 10		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a scientist during questioning and deliberate practice.		

	Autumn	Spring	Summer
Y10 **Triple award Science**	**Organisation (Biology)** **Atomic Structure & Bonding (Chemistry)** **Quantitative Chemistry** **Particles (Physics)** **Atomic Structure (Physics)**	**Infection & Response (Biology)** **Bioenergetics (Biology)** **Chemical Changes (Chemistry)** **Energy Changes (Chemistry)** **Electricity (Physics)**	**Homeostasis (Biology)** **Rates of Reaction (Chemistry)** **Chemical Analysis (Chemistry)** **Waves (Physics)**
Curriculum content	**Organisation:** Explains the structure and function of the digestive and cardiovascular system **Atomic Structure & Bonding:** Details the structure and properties of Ionic, Covalent and Metallic bonds **Quantitative** Chemistry: Explain how to calculate relative formula mass, percentage mass and concentration. **Particles.** Explains how energy affects particles and causes changes in state. Investigated specific heat capacity and latent heat of vaporisation. **Atomic Structure (Physics)** Describes the history of the atom and the type and properties of radioactivity. How radiation decays and its uses**.**	**Infection & Response** Explains how pathogens attack organisms and how they defend themselves. Includes vaccine and development of need drugs. **Bioenergetics:** How energy is exchanged in living organisms through the processes of respiration and photosynthesis. Investigates the factors that affect photosynthesis. **Chemical Changes:** Explains how the reactivity of metals is used to extract them from their ore. How acids and alkalis react to make salts and how electrolysis is used to separate substances. **Energy Changes** Explains how changes in bonds and energy can produce endothermic and exothermic reaction. **Electricity:** Explains how electricity is generated and travels through circuits to our homes. Investigates resistance.	**Homeostasis:** Explains how the nervous system and endocrine system maintain the same state within the body. **Rates of Reaction.** Describes the interactions between particles in a chemical reaction and the facts that affect rate of reaction. **Chemical Analysis:** Demonstrates a range of qualitative tests used by forensic and drug control scientists to identify gases, pure substances and formulation. **Waves: This** topic describes the types of waves and their properties, including electromagnetic waves Students investigate wave properties in liquids and solids
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. Student will complete a paper 1 Mock Exam in the Summer of this year. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in KS3		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a Scientist during questioning and deliberate practice.		

	Autumn	Spring	Summer
Y11 **Triple Science**	**Inheritance (Biology)** **Organic Chemistry** **Forces (Physics)**	**Ecology (Biology)** **Using Resources (Chemistry)** **Waves & Magnetism (Physics)**	**Exam Preparation**
Curriculum content	**Inheritance:** This topic will explain how genetic inheritance creates unique offspring and how variation drives evolutionary change. It explains how mutation can cause disease and how humans use selective breeding **Organic Chemistry:** This topic explains the structure and properties of hydrocarbons and their importance to humans. It explains how humans have developed methods to make crude oil more useful. **Forces:** This Topic looks at forces and their interactions. It investigates the relationships between forces and those that affect speed and acceleration. Students are introduced to Newtons Laws.	**Ecology:** This topic covers the complex interactions between species in an ecosystem. How materials are cycled, and the threat humans pose to biodiversity **Using Resources:** This topic looks how humans use the earth resources including processing wastewater and water for drinking. It describes how the life cycle of the materials we use impacts the planet. **Waves:** This topic describes the types of waves and their properties, including electromagnetic waves Students investigate wave properties in liquids and solids **Magnetism:** This topic explains magnetism, the motor effect and how the strength of electromagnets can be altered.	**Exam Preparation:** This time will be used to recap content for all six papers. It will focus of areas identified from previous exam as being challenging. It will also focus on practical skills, extended response and exam technique.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and Cumulative assessments every half term. Student will complete two Mock Examinations in November and February of this year. These will test student's knowledge recall and application of knowledge and skills across the three science disciplines. Throughout the year these assessments will build on and make links between the knowledge in the different topics, including previous topics and those taught in Year 10		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a scientist during questioning and deliberate practice.		

	Autumn		Spring		Summer	
Y12 **Biology**	**1 - Biological Molecules** **2 - Cells**	**1 - Biological Molecules** **2 - Cells**	**1 - Biological Molecules** **2 - Cells**	**3 -Genetics, Biodiversity and Classification** **4 - Organisms Exchange Substances**	**3 -Genetics, Biodiversity and Classification** **4 - Organisms Exchange Substances**	**3 -Genetics, Biodiversity and Classification** **4 - Organisms Exchange Substances**
Curriculum content	**3.1 Biological molecules** All life on Earth shares a common chemistry. This provides indirect evidence for evolution. Despite their great variety, the cells of all living organisms contain only a few groups of carbon-based compounds that interact in similar ways. Carbohydrates are commonly used by cells as respiratory substrates. They also form structural components in plasma membranes and cell walls. Lipids have many uses, including the bilayer of plasma membranes, certain hormones and as respiratory substrates. Proteins form many cell structures. They are also important as enzymes, chemical messengers and components of the blood. Nucleic acids carry the genetic code for the production of proteins. The genetic code is common to viruses and to all living organisms, providing evidence for evolution. The most common component of cells is water; hence our search for life elsewhere in the universe involves a search for liquid water. **3.2 Cells** All life on Earth exists as cells. These have basic features in common. Differences between cells are due to the addition of extra features. This provides indirect evidence for evolution. All cells arise from other cells, by binary fission in prokaryotic cells and by mitosis and meiosis in eukaryotic cells. All cells have a cell-surface membrane, and, in addition, eukaryotic cells have internal membranes. The basic structure of these membranes is the same and enables control of the passage of substances across exchange surfaces by passive or active transport. Cell-surface membranes contain embedded proteins. Some of these are involved in cell signaling – communication between cells. Others act as antigens, allowing recognition of 'self' and 'foreign' cells by the immune system. Interactions between different types of cell are involved in disease, recovery from disease and prevention of symptoms occurring at a later date if exposed to the same antigen, or antigen-bearing pathogen.			**3.3 Organisms exchange substances with their environment** The internal environment of a cell or organism is different from its external environment. The exchange of substances between the internal and external environments takes place at exchange surfaces. To truly enter or leave an organism, most substances must cross cell plasma membranes. In large multicellular organisms, the immediate environment of cells is some form of tissue fluid. Most cells are too far away from exchange surfaces, and from each other, for simple diffusion alone to maintain the composition of tissue fluid within a suitable metabolic range. In large organisms, exchange surfaces are associated with mass transport systems that carry substances between the exchange surfaces and the rest of the body and between parts of the body. Mass transport maintains the final diffusion gradients that bring substances to and from the cell membranes of individual cells. It also helps to maintain the relatively stable environment that is tissue fluid. **3.4 Genetic information, variation and relationships between organisms** Biological diversity – biodiversity – is reflected in the vast number of species of organisms, in the variation of individual characteristics within a single species and in the variation of cell types within a single multicellular organism. Differences between species reflect genetic differences. Differences between individuals within a species could be the result of genetic factors, of environmental factors, or a combination of both. A gene is a section of DNA located at a particular site on a DNA molecule, called its locus. The base sequence of each gene carries the coded genetic information that determines the sequence of amino acids during protein synthesis. The genetic code used is the same in all organisms, providing indirect evidence for evolution. Genetic diversity within a species can be caused by gene mutation, chromosome mutation or random factors associated with meiosis and fertilisation. This genetic diversity is acted upon by natural selection, resulting in species becoming better adapted to their environment. Variation within a species can be measured using differences in the base sequence of DNA or in the amino acid sequence of proteins. Biodiversity within a community can be measured using species richness and an index of diversity.		
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge.					
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate.					

	Autumn		Spring		Summer	
Y13 **Biology**	**5- Energy transfers between organisms** **6 -Organisms respond to changes in their environments**	**5- Energy transfers between organisms** **6 -Organisms respond to changes in their environments**	**5- Energy transfers between organisms** **6 -Organisms respond to changes in their environments**	**7 -Genetics, populations, evolution and ecosystems** **8 -The control of gene expression**	**7 -Genetics, populations, evolution and ecosystems** **8 -The control of gene expression**	**Exam Practice/Revision**
Curriculum content	**3.5 Energy transfers in and between organisms (A-level only)** Life depends on continuous transfers of energy. In photosynthesis, light is absorbed by chlorophyll and this is linked to the production of ATP. In respiration, various substances are used as respiratory substrates. The hydrolysis of these respiratory substrates is linked to the production of ATP. In both respiration and photosynthesis, ATP production occurs when protons diffuse down an electrochemical gradient through molecules of the enzyme ATP synthase, embedded in the membranes of cellular organelles. The process of photosynthesis is common in all photoautotrophic organisms and the process of respiration is common in all organisms, providing indirect evidence for evolution. In communities, the biological molecules produced by photosynthesis are consumed by other organisms, including animals, bacteria and fungi. Some of these are used as respiratory substrates by these consumers. Photosynthesis and respiration are not 100% efficient. The transfer of biomass and its stored chemical energy in a community from one organism to a consumer is also not 100% efficient. **3.6 Organisms respond to changes in their internal and external environments (A-level only)** A stimulus is a change in the internal or external environment. A receptor detects a stimulus. A coordinator formulates a suitable response to a stimulus. An effector produces a response. Receptors are specific to one type of stimulus. Nerve cells pass electrical impulses along their length. A nerve impulse is specific to a target cell only because it releases a chemical messenger directly onto it, producing a response that is usually rapid, short-lived and localised. In contrast, mammalian hormones stimulate their target cells via the blood system. They are specific to the tertiary structure of receptors on their target cells and produce responses that are usually slow, long-lasting and widespread. Plants control their response using hormone-like growth substances.			**3.7 Genetics, populations, evolution and ecosystems (A-level only)** The theory of evolution underpins modern Biology. All new species arise from an existing species. This results in different species sharing a common ancestry, as represented in phylogenetic classification. Common ancestry can explain the similarities between all living organisms, such as common chemistry (eg all proteins made from the same 20 or so amino acids), physiological pathways (eg anaerobic respiration), cell structure, DNA as the genetic material and a 'universal' genetic code. The individuals of a species share the same genes but (usually) different combinations of alleles of these genes. An individual inherits alleles from their parent or parents. A species exists as one or more populations. There is variation in the phenotypes of organisms in a population, due to genetic and environmental factors. Two forces affect genetic variation in populations: genetic drift and natural selection. Genetic drift can cause changes in allele frequency in small populations. Natural selection occurs when alleles that enhance the fitness of the individuals that carry them rise in frequency. A change in the allele frequency of a population is evolution. If a population becomes isolated from other populations of the same species, there will be no gene flow between the isolated population and the others. This may lead to the accumulation of genetic differences in the isolated population, compared with the other populations. These differences may ultimately lead to organisms in the isolated population becoming unable to breed and produce fertile offspring with organisms from the other populations. This reproductive isolation means that a new species has evolved. **3.8 The control of gene expression (A-level only)** Cells are able to control their metabolic activities by regulating the transcription and translation of their genome. Although the cells within an organism carry the same coded genetic information, they translate only part of it. In multicellular organisms, this control of translation enables cells to have specialised functions, forming tissues and organs. There are many factors that control the expression of genes and, thus, the phenotype of organisms. Some are external, environmental factors, others are internal factors. The expression of genes is not as simple as once thought, with epigenetic regulation of transcription being increasingly recognised as important. Humans are learning how to control the expression of genes by altering the epigenome, and how to alter genomes and proteomes of organisms. This has many medical and technological applications		
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge.					
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate.					

	Autumn	Spring	Summer
Y12 **Chemistry**	**Atomic structure** **Amount of substance** **Bonding** **Kinetics** **Organic chemistry**	**Energetics** **Chemical equilibria** **Organic chemistry (cont)**	**Oxidation and reduction** **Group 2 and group 7** **Periodicity** **Organic analysis**
Curriculum content	**Atomic structure:** students will build on models of the atom from GCSE, learning about the quantum mechanical model of the atom and mass spectrometry. **Amount of substance**: students will learn about the calculation of moles, concentrations, % yield and atom economy, titrations and the ideal gas equation. Students will complete the required practical on standard solutions and titrations. **Bonding**: pupils will build on their knowledge of ionic, covalent and metallic bonding from GCSE. Pupils will learn about intermolecular forces and the shapes of molecules. **Kinetics**: pupils will review collision theory, then build upon this knowledge to describe and explain Maxwell-Boltzmann distributions. Students will complete the required practical on measuring the rate of a chemical reaction. **Organic chemistry**: pupils will learn about the nomenclature of naming organic molecules and will be introduced to the concept of reaction mechanisms.	**Energetics**: pupils will link the concept of exothermic and endothermic reactions to enthalpy changes. They will learn key definitions and calculations involved in enthalpy changes such as formation, combustion and bond enthalpies. Students will complete the required practical by calculating enthalpy changes and using Hess's law. **Chemical equilibria**: pupils will revisit equilibria, and Le Chatelier's principle linking this to industrial processes. They will build on this by learning about the equilibrium constant, K_C, what it represents and how to perform calculations. **Organic chemistry**: pupils will build on the nomenclature learnt last term by discussing the structures and reactions of alkanes, alkenes and alcohols. Students will be able to describe and draw reaction mechanisms for reactions described above. Students will complete the required practical for dehydration of an alcohol to form and alkene.	**Oxidation and reduction**: pupils will learn about oxidation and reduction in terms of electrons (OILRIG), will be able to write half equations and determine the oxidation states of elements for given compounds. **Group 2 and group 7:** pupils will learn about the reactions and trends in group 2, such as their solubilities with sulfates and hydroxides. Pupils will learn the trends with the halogens, such as the trend in electronegativities, displacement reactions and reactions with sulfuric acid and water. **Periodicity**: Students will learn the trends in melting point across period 3 and explain this in terms of their structure and bonding. Pupils will learn the trends in ionisation energy across the period and down the groups. **Organic analysis**: pupils will learn the key test tube reactions to determine the functional groups in a molecule and learn about mass spectrometry and IR spectroscopy as a tool for identifying molecules.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge.		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate.		

	Autumn	Spring	Summer
Y13 **Chemistry**	**Thermodynamics** **Acids and bases** **Electrode potentials** **Optical isomerism** **Carbonyl chemistry** **Rate equations**	**Transition metals** **Ions in aqueous solutions** **Properties of period 3 elements** **Organic chemistry (aromatic, amines and biochemistry). K_p** **NMR and chromatography**	**Exam preparation**
Curriculum content	**Thermodynamics:** pupils will build on Y12 knowledge of enthalpy to describe more enthalpy definitions, allowing them to construct Born-Haber cycles. Pupils will learn about entropy, and link enthalpy and entropy in Gibbs free energy to explain the feasibility of a reaction. **Acids and bases**: pupils will define acids and bases in terms of Bronsted-Lowry. Pupils will learn to calculate pH of strong acids and bases, weak acids and buffers. Pupils will complete the required practical to measure the pH during an acid-base titration. **Electrode potentials**: pupils will learn about the chemistry of cells and batteries and perform calculations of voltages for different combinations of cells. Pupils will complete the required practical to make an electrochemical cell and measure the voltage **Optical isomerism**: pupils will learn that some molecules have isomers which are mirror images, which can give different properties. **Carbonyl chemistry**: pupils will learn about new functional groups called aldehydes and ketones and their reactions. Pupils will also learn about carboxylic acids, their derivatives and their reactions. Pupils will also complete the required practical by making aspirin. **Rate equations**: pupils will learn to write rate equations and explain the orders of reactions. Pupils will learn about and manipulate the Arrhenius equation. Pupils will perform the required practical to find the rate of reaction by the initial rates method.	**Transition metals**: pupils will learn the properties of transition metals and how they can be identifies. They will learn the formation of complex ions and their reactions. Pupils will learn about the use of transition metals in titrations and as catalysts. **Aqueous ions**: pupils will build on their knowledge of transition metals by seeing their properties and reactions when in aqueous solutions. Pupils will complete the required practical to identify different ions in solution. **Properties of period 3 elements**: pupils will build on their knowledge of P3 elements by discussing their reactions and the reaction of their oxides (including their acid/base nature). **Aromatic chemistry**: pupils will learn about the concept of aromaticity, including the structure, bonding and reactions of benzene. Pupils will learn the reaction mechanisms when benzene reacts with electrophiles. **Amines**: pupils will learn about the structure, reactions and naming of amines, including their basic nature and the factors affecting how basic they are. **Biochemistry**: pupils will learn about the chemistry of biological molecules and structure such as amino acids, proteins, DNA and enzymes. **NMR and chromatography**: pupils will learn how NMR can be used to determine the structures of molecules using carbon or hydrogen NMR. Pupils will learn the theory and use of chromatography as a separation/identification technique. Pupils will complete the required practical by completing chromatography, **K_p:** pupils will apply knowledge from Kc learnt in Y12 to gaseous systems, known as Kp.	Pupils will be exposed to revision throughout the summer term in preparation for their examinations.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge. **Pupils will complete mock exams to give accurate working at grades**.		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate.		

	Autumn	Spring	Summer
Y12 **Physics**	**Measurements and errors** **Particles and Radiation** **Waves**	**Mechanics and Materials** **Electricity**	**Waves and Practical Skills**
Curriculum content	**1 Measurements and their errors** Content in this section is a continuing study for a student of physics, which is constantly revisited in every new topic. A working knowledge of the specified fundamental (base) units of measurement is vital. Likewise, practical work in the subject is underpinned by an awareness of the nature of measurement errors and of their numerical treatment. **2 Particles and radiation** This section introduces students both to the fundamental properties of matter, and to electromagnetic radiation and quantum phenomena. Through a study of these topics, students become aware of the way ideas develop and evolve in physics. They will appreciate the importance of international collaboration in the development of new experiments and theories in this area of fundamental research.	**4 Mechanics and materials** Vectors and their treatment are introduced followed by development of the student's knowledge and understanding of forces, energy and momentum. The section continues with a study of materials considered in terms of their bulk properties and tensile strength. As with earlier topics, this section and also the following section Electricity would provide a good starting point for students who prefer to begin by consolidating work. **5 Electricity** This section builds on and develops earlier study of these phenomena from GCSE. It provides opportunities for the development of practical skills at an early stage in the course and lays the groundwork for later study of the many electrical applications that are important to society.	**3 Waves**. Studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of traveling waves and stationary waves. Topics treated include refraction, diffraction, superposition and interference.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge.		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a scientist during questioning and deliberate practice		

	Autumn	Spring	Summer
Y13 **Physics**	**Further Mechanics and Thermal Physics** **Fields and their consequences**	**Nuclear Physics** **Turning Points in Physics**	**Exam Preparation**
Curriculum content	**6 Further mechanics and thermal physics (A-level only)** The earlier study of mechanics is further advanced through a consideration of circular motion and simple harmonic motion (the harmonic oscillator). A further section allows the thermal properties of materials, the properties and nature of ideal gases, and the molecular kinetic theory to be studied in depth. **7 Fields and their consequences (A-level only)** The concept of field is one of the great unifying ideas in physics. The ideas of gravitation, electrostatics and magnetic field theory are developed within the topic to emphasise this unification. Many ideas from mechanics and electricity from earlier in the course support this and are further developed. Practical applications considered include planetary and satellite orbits, capacitance and capacitors, their charge and discharge through resistors, and electromagnetic induction. These topics have considerable impact on modern society.	**8 Nuclear physics (A-level only)** This section builds on the work of Particles and radiation to link the properties of the nucleus to the production of nuclear power through the characteristics of the nucleus, the properties of unstable nuclei, and the link between energy and mass. Students become aware of the physics that underpins nuclear energy production and also of the impact that it can have on society. **12 Turning points in physics (A-level only)** This option is intended to enable key concepts and developments in physics to be studied in greater depth than in the core content. Students will be able to appreciate, from historical and conceptual viewpoints, the significance of major paradigm shifts for the subject in the perspectives of experimentation and understanding. Many present-day technological industries are the consequence of these key developments and the topics in the option illustrate how unforeseen technologies can develop from new discoveries.	**Exam Preparation:** This time will be used to recap content for all three papers. It will focus of areas identified from previous exam as being challenging. It will also focus on practical skills, extended response and exam technique.
Assessment	Students are assessed through marking of red zones (self, peer and/or teacher) and assessments every half term. These will test student's knowledge recall and application of knowledge.		
Literacy links	Students will develop literacy skills through regular practice of command words such as describe, explain, assess and evaluate. They will be introduced to key scientific terms each lesson and are expected to speak and write like a scientist during questioning and deliberate practice		