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|  | **Half term 1**  **Learning Overview** | **Half term 2**  **Learning Overview** | **Half term 3**  **Learning Overview** | **Half term 4**  **Learning Overview** | **Half term 5**  **Learning Overview** | **Half term 6**  **Learning Overview** |
| **Year 12**  **Biology** | ***Biological molecules***  *The cells of all living organisms contain only a few groups of carbon-based compounds that interact in similar ways.* | **Cells**  *Cell structures and functions*  **Biological molecules**  *Carbohydrates, lipids, proteins, nucleic acids* | **Organisms exchange substances with their environment**  *The exchange of substances between the internal and external environments takes place at exchange surfaces.* | **Genetic information, variation and relationships between organisms**  *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.* | **Revision in preparation for AS mock exam**  **Transition to A level (Y13) content -** *Energy transfers in and between organisms* | **Transition to A level (Y13) content -** *Energy transfers in and between organisms* |
| **Year 12**  **Chemistry** | **Atomic structure**  *Fundamental particles*  **Amount of substance**  *Calculations*  **Bonding**  *Structure of compounds and their physical and chemical properties*  **Introduction to organic chemistry**  *Understanding the study of covalent compounds and how they are named using the IUPAC system*  **Alkanes**  *Understanding the uses of this raw material for the chemical industry* | **Haloalkanes**  *Understanding the uses of this raw material for the chemical industry*  **Alkenes**  *Understanding its uses and mechanisms of addition reactions*  **Energetics**  *Enthalpy change of chemical reactions* | **Alcohols**  *Understanding the scientific, medicinal and industrial uses*  **Kinetics**  *How a change in conditions affects the speed of a chemical reaction*  **Equilibria**  *How far reactions will go*  **Redox**  *Reactions involving transfer of electrons*  **Periodicity**  *Making sense of the physical and chemical properties of chemical elements* | **Organic analysis**  *Understanding organic molecules, their structure and the way they react*  **Group 2, 7 and 3**  *Trends in structure and physical properties* | **Revision in preparation for AS mock exam**  **Transition to A-Level content (Y13)**  **Aromatic chemistry**  *Understanding its structure and substitution reactions* | **Transition to A-Level content (Y13)**  **Thermodynamics**  *The stability of compounds and why chemical reactions occur* |
| **Year 12**  **Physics** | **Waves**  *GCSE knowledge of wave phenomena are extended through a development of knowledge of the characteristics, properties and applications of travelling waves and stationary waves. Topics include refraction, diffraction, superposition and interference.*  **Particles and radiation**  *An introduction to the fundamental properties of matter, EM radiation and quantum phenomena. 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.* | **Mechanics**  *Vectors and their treatment are developed from GCSE by furthering student’s study of forces, energy, moments and momentum. Pupils will extend their knowledge of Newton’s laws and consider problems involving projectiles,* | **Materials**  *The bulk properties and tensile strength of materials are considered. Pupils will study stress and strain of materials and the Young’s modulus.* | **Electricity**  *This section builds on GCSE electricity content. Pupils will also have the opportunity to develop their practical skills. Pupils will review the basics of electricity, series and parallel circuits and ohms law before looking at resistivity, the potential divider, EMF and internal resistance.* | **Revision in preparation for AS mock exam**  **Transition to A-Level content (Y13)**  **Further Mechanics**  *Pupils AS study of mechanics is developed by considering circular motion, SHM, forces vibrations and resonance.* | **Transition to A-Level content (Y13)**  **Further Mechanics**  *Pupils AS study of mechanics is developed by considering circular motion, SHM, forces vibrations and resonance.* |
| **Year 13**  **Biology** | **Energy transfers in and between organisms**  *In photosynthesis, light is absorbed by chlorophyll and this is linked to the production of ATP.*  *In respiration, various substances are used as partial pressures of reactants and products.*  *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.* | **Organisms respond to changes in their internal and external environments**  *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.*  *Plants control their response using hormone-like growth substances* | **Genetics, populations, evolution and ecosystems**  *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. A species exists as one or more populations.* *Populations of different species live in communities. Competition occurs within and between these populations for the means of survival.* | **The control of gene expression**  *Consideration of cellular control mechanisms underpins the content of this section. Students who have studied it should develop an understanding of the ways in which organisms and cells control their activities. This should lead to an appreciation of common ailments resulting from a breakdown of these control mechanisms and the use of DNA technology in the diagnosis and treatment of human diseases.* |  |  |
| **Year 13**  **Chemistry** | **Transition metals**  *Physical properties of these elements*  **Reactions of ions**  *Understanding how transition metals can be identified in the lab*  **Optical isomerism**  *Understanding the origin of optical isomers and how to represent them*  **Aldehydes and ketones**  *Understanding the function of the carbonyl group and how it reacts in addition reactions* | **Polymers**  *The properties and uses*  **Amino acids, proteins and DNA**  *The structure and bonding and the way they interact*  **Carboxylic acids and Amines**  *Understand their uses, functions and mechanisms of reaction*  **Rate equations**  *Mechanism of a reaction*  **Equilibria**  *Calculate how equilibrium yield will be influenced by the partial pressures of reactants and products* | **NMR and Chromatography**  *The use of analytical data to solve problems*  **Electrode potentials and electrochemical cells**  *Understanding how they work and the important commercial applications* | **Acids and bases**  *Understand how acids and bass are important in domestic, environmental and industrial contexts*  **Organic synthesis**  *Formation of ne organic compound by multi-step syntheses* |  |  |
| **Year 13**  **Physics** | **Thermal Physics**  *The properties and nature of ideal gases and the molecular kinetic theory are studied in depth. Pupils further their GCSE knowledge of thermal energy transfer and ideal gases before looking at the molecular kinetic theory model.* | **Fields and their consequences (HT1 and 2)**  *The concept of fields is one of the great unifying ideas in physics. The ideas of gravitation, electrostatics and magnetic field theory are developed in the topic to emphasise the unification. Many ideas from mechanics and electricity from earlier in the course are used to support this topic then further developed. The practical applications of these fields are also considered.* | **Nuclear physics**  *This topic builds on ideas studied about particles and radiation to link the properties of the nucleus to the production of nuclear power through to the characteristics of the nucleus, the properties of unstable nuclei and the link between mass and energy* | **Astrophysics**  *Fundamental physical principles are applied to the study and interpretation of the universe. Students gain a deeper insight into the behaviour of objects at a greater distance from Earth and discover ways in which information from these objects can be gathered. The underlying physics principals of the devices used are covered and give some indication of the new information gained by using radio astronomy.* |  |  |