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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 7** | **Cell structure & diffusion**  *Basic structures & functions* | **Plants & photosynthesis**  *Basic structures & functions*  **Reproduction**  *Puberty, menstrual cycle & fertilisation* | **Adaptation**  *Organisms, competition &habitats* |  |  | **How science works**   * *Collecting experimental data* * *Identifying variables* * *Interpreting graphs* * *Plotting data* |
| **Atoms, elements, compounds and mixtures**  *Examples of structures & interpreting formulae* | **Reactions**  *Exploring and describing simple chemical reactions* |  | **Periodicity**  *Understanding the importance of the periodic table and its trends* | **Atmosphere**  *Understanding the atmosphere & climate change* |
| **Particles**  *Particle arrangement & movement* | **Electricity**  *Understanding key concepts by constructing series & parallel circuits* | **Forces**  *Understanding the differences between Balanced/ unbalanced forces & contact/non-contact forces* |  | **Energy transfers**  *Calculating and representing energy transfer using diagrams* |
| **Year 8** | **Digestive system & Enzymes**  *Healthy diets & digestion* | **Bioenergetics**  *Understanding diet/metabolism & the importance of exercise* | **Inheritance**  *Understanding variation and the differences between inherited and environmental factors* | **Ecology**  *Feeding relationships and levels or organisation* |  | **How science works**   * *Planning experiments and reasoning* * *Plotting data using pie charts, bar charts and line graphs* * *Rearranging equations* |
| **Matter**  *Understanding mixtures & separating techniques* | **Reactions**  *Simple chemical reactions and being able to construct word & symbol equations* | **Periodicity**  *Reactivity of metals & their uses* |  | **Earth and the atmosphere**  *Rocks & the rock cycle* |
| **Electromagnetism**  *Exploring magnets* & *magnetic fields* | **Forces**  *Exploring the solar system, its planets and orbits* |  | **Energy**  *Understanding how waves carry energy and information in air, fluids and solids.* | **Forces**  *Understanding how objects move and how far they move (motion).* |
| **Year 9** | **Cell biology**  *Exploring how structural differences between types of cells enables them to perform specific functions within the organism* | **Organisation (I)**  *Understanding how the digestive system works and factors that affect enzyme activity* | **Bioenergetics**  *Exploring how plants harness the Sun’s energy in photosynthesis in order to make food and looking at the effects of temperature, light and carbon dioxide concentration* | **Bioenergetics**  *Exploring how plants and animals carry out respiration and perform functions.* | **Organisation (II)**  *Describing the structure of the heart, its function & factors that may affect it.* | **Organisation (II)**  *Understanding how the structure of plants link to their functions and the rate of transpiration* |
| **Atomic structure**  *Exploring the structure, function & history of the atom* | **The periodic table**  *Understanding how the periodic table is organised and trends in group 1 and 7* | **Bonding, structure and properties of matter**  *Being able to draw an represent the different types of bonding* | **Bonding, structure and properties of matter**  *Using theories of structure and bonding to explain the physical and chemical properties of materials.* | **Chemical changes**  *Understanding and exploring the reactivity of metals & how they can be used to make salts* | **Chemical changes**  *Exploring how metals can be extracted and separated using methods of electrolysis in molten and aqueous solutions* |
| **Energy I**  *Energy changes in a system & calculating the ways it can be stored or transferred* | **Energy II**  *Global and national energy resources & their impact on the environment* | **Particle model of matter**  *The behaviour of solids, liquids and gases & the density of materials* | **Electricity (I)**  *Investigating series & parallel circuits, understanding the differences between components & calculating resistance.* | **Electricity (II)**  *The national grid and understanding how plugs and fuses work* | **Atomic structure**  *Understanding how the structure of the atom links to nuclear radiation, radioactive decay & contamination* |
| **Year 10** | **Infection & response**  *Understanding how we can avoid diseases and how our body uses barriers against pathogens.* | **Homeostasis**  *Exploring the structure and function of the nervous system works & how it can bring about fast responses* | **Homeostasis**  *The role of hormones in reproduction and in plants* | **Ecology**  *Understanding how materials are recycled, being released and decomposed.* | **Ecology**  *How humans are threatening biodiversity as well as the natural systems that support it.* |  |
| **Quantitative chemistry**  *Calculations &and analysis to determine the formula of compounds and equations for reactions* | **Energy changes**  *Exploring exothermic & endothermic reactions and the transfer of energy due to bond being broken and made.* | **Chemistry of the atmosphere**  *Evolution of the atmosphere* from the Earth’s early atmosphere | **Rate of chemical change**  *Factors affecting the rate and extent of chemical reactions* | **Rate of chemical change**  *Equilibrium reactions, the conditions affecting it and knowing how to maximise yield* | **Chemical analysis**  *Chemical testing and its advantages and disadvantages* |
| **Forces I**  *Understanding the differences between vectors, scalars, work done and energy transfers & Hookes law* | **Forces II**  *Newtons laws, forces and braking*  *Velocity-time and distance-time graphs*  *Acceleration*  *momentum* | **Forces II**  *Moments, levers and gears, pressure in fluids* | **Waves**  *Understanding the properties of waves* | **Waves**  *Electromagnetic spectrum properties and applications.*  *Lenses and black body radiation* | **Space**  *Life cycle of a star, planets, satellites & orbits* |
| **Year 11** | **Inheritance, variation, evolution**  *Understanding how chromosomes halve and combine with new genes and why this sometimes leads to gene mutations* | **Inheritance, variation, evolution**  *Understanding why scientists may intervene using selective breeding and genetic engineering.* | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** |  |
| **Organic chemistry**  *The chemistry of carbon compounds, their structure, function & importance.* | **Using resources**  *Study of how human activity has affected the Earth’s natural cycles, and how damaging effects can be minimised* | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** |  |
| **Magnetism**  *Magnets and magnetic fields. How electromagnets electric motors and generators work. Explaining how transformers work and completing calculations.* | **Space (triple only)**  *Life cycle of a star, planets, satellites & orbits. Redshift and the origin of the universe. Also understanding how evidence can change theories and how there is still much about the universe we don’t understand.* | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** | **Revision in preparation for GCSE exams** |  |
| **Year 12** | ***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* |
| **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* |
| **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** | **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.* |  |  |
| **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* |  |  |
| **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.* |  |  |