

Year 11 Curriculum Plan

Science



Autumn		Spring/Summer
PRIOR	<p>. The focus this term will be on a comprehensive review of their prior learning in all areas of Biology, Chemistry and Physics featuring in the AQA paper 1 specification. This process aims to identify both strengths and areas that may require further attention, allowing for a tailored approach to their ongoing academic development. Weekly assessments will be conducted with precision, and our commitment is to provide support and enrichment where needed.</p>	<p>The focus this term will be on a comprehensive review of their prior learning in all areas of Biology, Chemistry and Physics featuring in the AQA paper 2 specification. This process aims to identify both strengths and areas that may require further attention, allowing for a tailored approach to their ongoing academic development. Weekly assessments will be conducted with precision, and our commitment is to provide support and enrichment where needed.</p>
KNOWING WHAT...	<p>Biology: Cell Biology The differences between eukaryotic and prokaryotic cells, specialised cells, the use of microscopes, cell differentiation, the practical uses of stem cells, the cell cycle and mitosis. Organisation Plant and animal tissues, organs and systems, the heart, the blood vessels, the effect of lifestyle on health, the digestive system, enzymes the circulatory system, blood vessels, heart and transport in plants. Infection And Response The four pathogens with examples. The body's first line defences. How microbes make us feel ill and how viruses damage cells. The role of white blood cells. How vaccines prevent disease. The importance of antibiotics and the impact of antibiotic resistance. The main steps in the development and testing of a new drug. Bioenergetics The role of photosynthesis and plant transport. The lessons in this unit cover the structure of the plant and leaf, photosynthesis, transpiration, and translocation, as well as plant diseases. This unit includes one required practical activity: photosynthesis.</p> <p>Chemistry: Atomic structure and the periodic table Atoms & elements, separation techniques, history of the atom, electronic structure, isotopes, development of the periodic table, patterns of reactivity and properties and transition metals. Bonding, structure, and the properties of matter Ionic bonding, the properties of ionic compounds, diagrams of covalent bonding, properties of simple and giant covalent substances, properties and structure of diamond, graphite and the fullerenes, polymers and alloys, and changes of state. Quantitative chemistry the law of conservation of mass. Relative formula mass. What is a mole and what is concentration. Chemical changes How metal oxides are produced. The reactivity series, extraction of metals and the process of electrolysis. REDOX reactions. Reactions of acids, including naming salts produced. Strong and weak acids Energy changes Energy changes during chemical reactions. The differences between exothermic and endothermic reactions, and their uses; activation energy; reaction profiles and energy calculations</p> <p>Physics: Energy Stores and systems, work done and power, conservation and dissipation of energy, efficiency, national and global energy resources. This unit includes one required practical activity: specific heat capacity. Electricity Electric charge, electric circuits and power. Circuit symbols; current, potential difference and resistance; the properties of current and potential difference in series and parallel circuits; the effect of adding resistors in series and parallel on overall resistance; the names, colours, and purpose of the 3 wires found in the UK mains plug. Particle model of matter the particle model, changes of state, density, temperature changes and specific heat capacity. This unit includes one required practical activity: density.</p>	<p>Biology: Homeostasis And Response the structure of different neurones, explaining how they work within different reflex actions. The endocrine system, how this is controlled, and the functions of the main hormones involved. The role of hormones in maintaining the balance of water, glucose, and temperature in the body. The process of negative feedback in different contexts, explaining how this helps to maintain balance. Compare and contrast hormonal and nervous responses, the use of IVF to promote fertility and the use of contraceptives to control fertility. Inheritance, Variation and Evolution How evolution occurs through natural selection. The process and/or impacts of selective breeding. The benefits and risks of genetic engineering. The evidence for evolution. The factors which could lead to extinction. The current issue of antibiotic resistance. Ecology Different levels of organisation in an ecosystem from individual organisms to the whole ecosystem. The effect of changing biotic and abiotic factors on a community. Adaptations and predator/prey relationships. How materials are cycles (water and carbon). Biodiversity and the effect of human interaction on ecosystems.</p> <p>Chemistry: The rate and extent of chemical change the term rate of reaction. Collision theory and the four factors that affect the rate of chemical reactions. The units for rate of reactions. Organic chemistry the different hydrocarbons. Examples of the alkanes. Separating mixtures using fractional distillation. The process of cracking to make more useful materials. Chemical analysis Pure substances and formulations; the tests for common gases; chromatography. Chemistry of the atmosphere The Earth's early atmosphere and today's atmosphere. The changes in the atmosphere over time. The causes of increasing Carbon dioxide levels. The consequences of increasing Carbon dioxide levels and the common atmospheric pollutants. Using resources Finite and non-finite resources. Sources of water. Methods for purifying water. Methods of sterilising water and how properties of a material are linked to its use.</p> <p>Physics: Forces What a force is and examples of contact and non-contact forces. Newtons 3 laws of motion. The factors that can affect the stopping distance of a car. Elasticity and Hooke's Law. Waves The nature of waves. The different regions of the electromagnetic spectrum and the properties and uses of each. Magnetism and electromagnetism Permanent and induced magnets. What happens when the poles of magnets are placed near each other. How an electromagnetic field is induced around a solenoid. How an electric motor works.</p>

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	<p>Atomic structure the role of different scientists in the history of atomic structure. The properties of each of the three types of radioactive emissions. What contamination and irradiation are.</p>	
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KNOWING HOW...	<p>Biology: Cell Biology Required practical: use a light microscope to observe and record animal and plant cells. Required practical: investigate osmosis through plant tissue. Comparison of cell organelles, explaining functions of specialised cells, writing a method for using a microscope to view and prepare cells, identifying variables in an investigation, and evaluating stem cells. Organisation Required practical: Complete tests for protein, lipids, glucose and carbohydrates. Required practical: Investigate the effect of pH on enzymes. Understanding size and scale, calculating rates, and evaluating risks of blood products and/or treatments of CHD. Infection And Response Drawing and labelling diagrams of cells, using scale and unit conversions and interpreting data from graphs. Bioenergetics Measure and calculate the rate of photosynthesis. Extracting and interpreting graphs of photosynthesis rate involving one limiting factor. Writing a method to investigate the effect of light intensity on the rate of photosynthesis.</p> <p>Chemistry: Atomic structure and the periodic table Carry out filtration, evaporation, distillation and chromatography to separate mixtures. Make observations for the reactions of Group 1 and Group 7 elements. Extracting information, writing methods for separation techniques, using standard form, relating properties to structure, interpreting practical observations and extracting data from tables/graphs. Bonding, structure, and the properties of matter Ionic and covalent reactions; Investigating ionic compounds; Properties of alloys; Changes in states of matter. The use of 2D and 3D diagrams to represent atoms, balancing equations, making predictions and using state symbols. Quantitative chemistry Balancing chemical equations; Calculating relative formula mass; Calculating concentrations; Calculating quantities in reaction using moles; Calculating yields. Chemical changes Required practical: preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate. Required practical: investigate what happens when aqueous solutions are electrolysed using inert electrodes. Write ionic equations for displacement reactions. Investigate pH changes when a strong acid neutralises a strong alkali. Write half equations for the reactions occurring at the electrodes during electrolysis. Energy changes Investigate the variables that affect temperature changes in reacting solutions. Distinguishing between exothermic and endothermic reactions based on the temperature change of the surroundings using given data. Drawing simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions. Calculating the energy transferred in chemical reactions using bond energies supplied.</p> <p>Physics: Energy Required practical: determine specific heat capacity of one or more materials. Calculate elastic potential and/or kinetic energy of a given object; using and rearranging equations, using prefixes, identifying units of measurement, evaluating energy resources and explaining trends in data. Electricity Required practical: investigate the factors affecting the resistance of electrical circuits. Required practical: I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. Use circuits diagrams to create functioning series and parallel circuits; and draw circuit diagrams from images of electric circuits. Use a range of mathematical formulae to calculate and explain energy transfers in electrical circuits, including efficiency calculations. Particle model of matter Required practical: Calculating densities of regular and irregular objects. Investigating changes of state in terms of mass; Heating / cooling curves; Changes in states of matter; using scientific models,</p>	<p>Biology: Homeostasis And Response Planning an investigation into the effect of a factor on reaction times. Identifying scientific variables especially control variables. Inheritance, Variation and Evolution Explaining the benefits and risks of selective breeding given appropriate information and consider related ethical issues. Extracting information from an evolutionary tree. Classifying organisms using the Linnaean system. Understanding how scientific methods and theories develop over time. Ecology Required practical: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. Extract and interpret information from charts, graphs and tables relating to the interaction of organisms within a community. The process of peer review.</p> <p>Chemistry: The rate and extent of chemical change Applying collision theory to explain the effect of concentration, temperature, surface area. and catalysts on rate of reaction. Drawing reaction profile graphs and use them to draw conclusions. Calculating mean / rate at a given point in time Organic chemistry Recognising substances that are alkenes from their names or from given formulae. Labelling a diagram of fractional distillation. Applying understanding of MP and BP data. Chemical analysis Required practical: Investigate how paper chromatography can be used to separate coloured substances. Using melting point and boiling point data to distinguish pure from impure substances. Interpreting chromatograms and calculating R_f values. Chemistry of the atmosphere Extracting and interpreting information about resources from charts, graphs, and tables (especially focusing on pie charts). Using resources Required practical: Analyse samples of water from different sources in terms of the pH and presence of dissolved solids and distil sea water to obtain potable water. Analysing lifecycle assessment data to compare environmental impact of products.</p> <p>Physics: Forces Required practical: Investigate the effect of force on acceleration. Required practical: Investigate the stretching effects of a force on a spring. Interpreting motion graphs. Calculating motion using a range of formulae. Using Hooke's Law. Calculating a spring constant. Waves Required practical: measure frequency, wavelength and wave speed by observing water waves in a ripple tank and by observing waves in a solid. Required practical: Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface. Identifying distinctive features of transverse and longitudinal waves. Calculating wave speed, frequency and wavelength using formulae. Magnetism and electromagnetism Using the right-hand grip rule. Using Fleming's left-hand rule. Calculating magnetic flux density.</p>

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	<p>using appropriate scientific apparatus, identifying resolution, rearranging and applying equations, using prefixes and units of measurements, analysing data from graphs, writing scientific methods.</p> <p>Atomic structure Completing nuclear equations. Calculating half-life from a decay curve and from data.</p>	
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ASSESSMENT	<p>Each week, substantive and disciplinary knowledge identified above will be assessed via</p> <ul style="list-style-type: none"> • Multiple choice questions during lessons • Student's written and verbal responses in class • 6 mark extended answer questions in class. • Home learning tasks including teams-based quiz, Seneca assignments and written tasks. • PPE 1 examination on paper 1 content. 	<p>Each substantive and disciplinary knowledge identified above will be assessed via:</p> <ul style="list-style-type: none"> • Multiple choice questions during lessons • Student's written and verbal responses in class • 6 mark extended answer questions in class. • Home learning tasks including teams-based quiz, Seneca assignments and written tasks. • PPE 2 examination on paper 2 content. • Full past examinations in the build up to the summer GCSE's