

Long Term Plan – Combined Science (2026-2027)

Vision: We are a department that inspires curiosity, nurtures critical thinking and problem-solving, delivering rich scientific knowledge and real-life preparation so every learner feels empowered, challenged and motivated to explore the world with confidence and wonder.							Year End Points
	HT1	HT2	HT3	HT4	HT5	HT6	
Year 10 Biology	Cell biology Required practical microscopes Required practical osmosis	Organisation Required practical food tests Required practical enzymes	Infection and response	Infection and response	Bioenergetics Required practical photosynthesis	Ecology Required practical sampling	By the end of year 10 students will know: How to compare the light and electron microscope, how to covert between mm, μm and nn and how to calculate magnification. The difference between prokaryotic and eukaryotic cells. The role of diffusion, osmosis and active transport and how to apply this knowledge to lungs and fish gills, for example. How normal body cells grow and divide during the cell cycle and the role of mitosis. How the digestive system works and the role of a variety of enzyme groups in digestion. How to test for different food groups and how to find the optimum conditions for enzymes. The need for transport systems in multicellular organisms, including plants, the relationship between the structure and functions of the human circulatory system and the function of the gas exchange system in animals. How evaporation and transpiration are controlled in plants. The relationship between health and disease, communicable diseases including sexually transmitted infections in humans (including HIV/AIDs), non-communicable diseases , the role of bacteria, viruses and fungi as pathogens in animals and plants, the body's defences against pathogens and the role of the immune system against disease, how to reduce and prevent the spread of infectious diseases in animals and plants, the process of the discovery and development of new medicines and the impact of lifestyle factors on the incidence of non-communicable diseases. The process of photosynthesis and the factors affecting the rate of photosynthesis. The importance of cellular respiration and the processes of aerobic and anaerobic respiration both in animals and plants. The difference between a community and an ecosystem. Some abiotic and biotic factors which affect communities; the importance of interactions between organisms in a community, methods of identifying species and measuring distribution, frequency and abundance of species within a habitat, organisms are interdependent and are adapted to their environment.

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Year 10 Chemistry	Atomic structure and the periodic table	Bonding, structure and the properties of matter	Quantitative chemistry Chemical changes	Chemical changes Required practical Making salts. Required practical Electrolysis.	Energy changes Required practical Temperature changes.	The rate and extent of chemical change (not including required practical)	By the end of year 10 students will know: That atoms consist of a nucleus containing protons and neutrons, with electrons arranged in energy levels (shells) around the nucleus. Students should be able to define atomic number and mass number, and use these to calculate the number of subatomic particles in an atom or ion. How elements are arranged in the periodic table in order of increasing atomic number, and recognise patterns in the rows (periods) and columns (groups). For example, students should know that elements in the same group have similar chemical properties because they have the same number of electrons in their outer shell. The distinction between metals and non-metals should also be understood, including how their properties differ. How to describe and explain ionic bonding (between metals and non-metals), covalent bonding (between non-metals), and metallic bonding (in metals). They should be able to draw simple dot-and-cross diagrams for these bonds and link the type of bonding to the physical properties of substances, such as melting point, solubility, and ability to conduct electricity. The different chemical changes that can take place and these chemical changes can be classified in different ways. Students will be able to predict exactly which new substances will be formed. That the extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be ‘pulled apart’ using the principles of electrolysis. How to represent chemical reactions and given information, students will be able to use quantitative methods to determine the purity of chemical samples. That energy changes are an important part of chemical reactions and the interaction of particles often involves the transfer of energy due to the breaking and formation of bonds. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. Students will know that these interactions between particles can produce heating or cooling effects that are used in a range of everyday applications and that some interactions between ions in an electrolyte result in the production of electricity.

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Year 10 Physics	Energy Electricity (started)	Electricity Required practical Resistance Required practical IV characteristics	Particle model of matter Required practical Specific heat capacity Required practical density	Atomic structure	Forces	Forces Required practical acceleration Required practical force and extension	By the end of year 10 students will know: The different types of renewable and non-renewable energy resources used on Earth and why they are considered either renewable or non-renewable. That power is the rate of transfer of energy, how to calculate energy efficiency for any energy transfer and that the domestic a.c. supply is 50Hz and on average 230V. Students will know how to identify live, neutral and earth mains wires, safety measures to take when wring a plug and the power transfer related to p.d. and current, or current and resistance. How to relate the models of the molecules in solid, liquid and gas phases to their densities. Students will know that changes of state are reversible. Students will also know how to calculate the energy changes involved in heating, how to calculate specific heat capacity and specific latent heat. Students will be able to make links between the pressure and temperature of a gas at a constant volume. The current nuclear model and its development in the light of changing evidence. Students will also know how to work out the number of protons and neutrons using the atomic number and the mass number and the identities of nuclei, isotope characteristics and how to use the equations to represent changes. Students will know the difference between ionisation; absorption or emission of radiation related to changes in electron orbits. Students will be able to identify radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma rays using changes in the nuclear mass and/or charge. Students will know the dangers of radioactive materials, the importance of half-life and irradiation, contamination and their associated hazardous effects including waste disposal. How to calculate the speed of sound, how to estimate speeds and accelerations in everyday contexts, and how to interpret quantitatively graphs of distance, time, and speed. How to identify contact and non-contact forces and that forces are vectors. Students will know how to calculate work done as force x distance and the difference between elastic and inelastic stretching. That acceleration is caused by forces; how to apply Newton’s First Law and how to calculate weight and gravitational field strength and the importance of decelerations and braking distances in relation to road safety.

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Year 11 Biology	Ecology	Homeostasis and response Required practical reaction times	Homeostasis and response Inheritance, variation and evolution	Inheritance, variation and evolution			By the end of year 11 students will know: The principles of homeostasis and how nervous coordination and control in humans maintains optimum conditions. The relationship between the structure and function of the human nervous system, the relationship between structure and function in a reflex arc. The principles of hormonal coordination in humans including the hormones involve in human reproduction and the use of hormonal and non-hormonal methods of contraception. The genome as the entire genetic material of an organism and how the genome and its interaction with the environment influence the phenotype of an organism. How sex is determined in humans. How single gene inheritance and single gene crosses involving dominant and recessive phenotypes can occur. The idea that most phenotypes result from the interaction of many genes and how genomics can impact medicine through ideas such as embryo screening and the ethics involved. That there is genetic variety within populations of a species and natural selection leads to evolution. The evidence that scientists use for evolution and how the study of classification has developed. The importance of selective breeding of both plants and animals in agriculture and the use of modern biotechnology in farming along with the practical and ethical challenges. How materials cycle through abiotic and biotic components of ecosystems and the role of microorganisms (decomposers) in the cycling of materials through an ecosystem. How organisms are interdependent and are adapted to their environment and the importance of biodiversity and some of the positive and negative human interactions with ecosystems.

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Year 11 Chemistry	The rate and extent of chemical change Required practical Rates. Organic chemistry	Chemical analysis Required practical Chromatography Chemistry of the atmosphere	Using resources Required practical Water purification.	Using resources Required practical Water purification.			By the end of year 11 students will know: That chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product. Students will know that in industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product and whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way. How to distinguish between pure and impure substances and how to carry out separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation. That different factors that can influence the rate of reaction including varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst and the factors affecting reversible reactions. That carbon compounds are used both as fuels and feedstock, and the competing demands for limited resources. How fractional distillation of crude oil and cracking are used to make more useful materials. How to apply life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life. The evidence for the composition and the evolution of the Earth's atmosphere since its formation. The evidence, and the uncertainties in evidence, for climate change. The potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate. Other common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources. The Earth's water resources through the detailed study of the water cycle and how we obtain potable water and the treatment of waste water to allow safe discharge into the water courses.

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Year 11 physics	Forces Required practical acceleration Required practical force and extension	Waves Required practical Waves. Required practical Radiation and absorption.	Magnetism and electromagnetism				By the end of year 11 students will know: Amplitude, wavelength, frequency, relating velocity to frequency and wavelength, transverse and longitudinal waves, velocities differing between media: absorption, reflection, refraction effects. Electromagnetic waves, velocity in vacuum; waves transferring energy; wavelengths and frequencies from radio to gamma-rays, production and detection, by electrical circuits, or by changes in atoms and nuclei, uses in the radio, microwave, infra-red, visible, ultra-violet, X-ray and gamma ray regions, hazardous effects on bodily tissues. Exploring the magnetic fields of permanent and induced magnets, and the Earth’s magnetic field, using a compass, magnetic effects of currents, how solenoids enhance the effect, how transformers are used in the national grid and the reasons for their use.