Long Term Plan – Triple Science (2024-25)

Vision: Our vision is to ignite a passion for science in every student. We strive to create a dynamic, hands-on learning environment where curiosity thrives and students are empowered to explore the wonders of science. Our aim is to develop critical thinkers and problem solvers equipped with the skills and knowledge to address real-world challenges. By integrating sustainable practices and collaborative projects, we prepare students to lead in a rapidly evolving scientific landscape. We are committed to fostering a culture of scientific curiosity and inspiring students to make meaningful contributions to society and the global community.

	HT1 Sept – Oct	HT2 - Oct- Dec	HT3 - Jan-Feb	HT4 - Feb-Mar	HT5 - Apr-May	HT6 - June-July	Year End Points
Year 10 Biology	B4 Organising animals and plants, blood, gas exchange and transport systems in plants.	B5 Communicable disease triple only content. B6, B7 non-communicable disease and the prevention of disease. **Growing bacteria required practical.**	B8 photosynthesis **Required practical Photosynthesis.**	B9 respiration B10 Nervous system **Required practical Reaction time.**	B10 Nervous system	B16 Adaptation, interdependence and competition **Required practical – Field investigations**	By the end of year 10 students will know: 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. 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. How monoclonal antibodies are made and some examples of their uses including pregnancy tests, the diagnosis of disease, monitoring levels of infection, treating disease and research. 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. The principles of nervous coordination and control in humans, the relationship between the structure and function of the human nervous system, the relationship between structure and function in a reflex arc. 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.

Long Term Plan – Triple Science (2024-25)

Year 10 Chemistry	C2.6 Transition metals, C3.11Nanoparticles, C3.12 Applications of nanoparticle need to be covered as triple only content. C5 chemical changes	C5 chemical changes **Required practical Making salts.** C6 Electrolysis **Required practical Electrolysis.**	C4 – Chemical calculations **Required practical Neutralisation.**	C4 – Chemical calculations **Required practical Neutralisation.**	C7 Energy changes **Required practical Temperature changes.**	C8 Rates and equilibrium and required practical (rates.) **Required practical Rates of reaction.**	By the end of year 10 students will know: 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. How to use titration to determine the concentration of acids and alkalis. 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. Cells and batteries use these chemical reactions to provide electricity. Students will also know that electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way. 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.

Long Term Plan – Triple Science (2024-25)

Year 10 Physics	P3 Energy resources P5 Electricity in the home	P5 Electricity in the home P6 Molecules and matter including P2.2, P2.3, **Required practical Thermal insulation** **Required practicals Specific heat capacity and density**	P6 Molecules and matter including P2.2, P2.3, **Required practical Thermal insulation** **Required practicals Specific heat capacity and density** P7 Radioactivity	P7 Radioactivity	Paper 1 retrieval in preparation for the mock exam P9 Motion P8 - P10 Forces and motion **Required practicals Acceleration and Force and extension.**	P11 Force and Pressure	By the end of year 10 students will know: Renewable and non-renewable energy sources used on Earth, changes in how these are used. Power as the rate of transfer of energy, calculating energy efficiency for any energy transfers, the domestic a.c. supply; live, neutral and earth mains wires, safety measures, power transfer related to p.d. and current, or current and resistance. Relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities, melting, evaporation, and sublimation as reversible changes, calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat, links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative). The nuclear model and its development in the light of changing evidence, masses and sizes of nuclei, atoms and small molecules, differences in numbers of protons, and neutrons related to masses and identities of nuclei, isotope characteristics and equations to represent changes, ionisation; absorption or emission of radiation related to changes in electron orbits, radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma rays, related to changes in the nuclear mass and/or charge, radioactive materials, half-life, irradiation, contamination and their associated hazardous effects, waste disposal, nuclear fission, nuclear fusion and our Sun's energy. Speed of sound, estimating speeds and accelerations in everyday contexts, interpreting quantitatively graphs of distance, time, and speed. Forces and fields: electrostatic, magnetic, gravity, forces as vectors, calculating work done as force x distance; elastic and inelastic stretching, pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative). Acceleration caused by forces; Newton's First Law, weight and gravitational field strength, decelerations and braking distances involved on roads, safety. Pressure, changes in pressure with variation in depth in water and also in the atmosphere, upthrust, floating and density.

Long Term Plan – Triple Science (2024-25)

Year 11 Biology	B11 Hormonal control **Required practical Plant responses.**	B12 Homeostasis in action B13 Reproduction.	B14 Variation and evolution	B15 Genetics and evolution	B18 Biodiversity and ecosystems.		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. How plant hormones enable plants to respond to light and gravity and how hormones are used in horticulture. The detail of homeostasis including the control of body temperature and water levels using the hormone ADH. The basic structure of the kidney and its function in filtering the blood and controlling water levels in the body. 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 role of key scientists including; Gregor Mendel, Jean Baptiste Lamarck, Charles Darwin, Alfred Wallace Carl Linnaeus. including; 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.

Long Term Plan – Triple Science (2024-25)

Year 11 Chemistry	C12 Chemical analysis **Required practical Chromatography and Identifying ions.** C9 Crude oil	C10 Organic reactions C11 Polymers	C13 The Earth's atmosphere C14 The Earth's resources **Required practical Water purification.**	C15 Using our resources.			By the end of year 11 students will know: 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 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 important organic chemistry is and the great variety of carbon compounds that are possible due carbon compounds forming chains and rings linked by carbon atoms. How to identify different types of organic molecules by their functional group and how to name these compounds. The use of addition and condensation polymerisation in creating useful products. 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.

Long Term Plan – Triple Science (2024-25)

Year 11 Physics	P12 Wave properties **Required practical Waves.**	P13 Electromagnetic waves **Required practical Radiation and absorption.** P14 Light **Required practical light.**	P15 Electromagnetism	P16 Space			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. Reflection and refraction, the causes of refraction, coloured light, how light behaves depends on the medium (transparent, translucent, opaque), what happens to light as it passes through different lenses. 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. The life cycle of a star, how red-shift has proven the Big Bang to be the most realistic method for the creation of the Universe, the main features of the solar system.