SCIENCE

Year 10

What are the aims and intentions of this curriculum?

AQA Combined Science Trilogy is taught at the Parkside Studio College as one of the core subjects at KS4**.** It equips students with skills and knowledge transferable to both educational and career settings, and provides a worthwhile course for students of various ages and from diverse backgrounds in terms of general education and lifelong learning. The units covered in this scheme of work are unit one: biology, chemistry, and physics. The knowledge and skills ascertained throughout the study of the course will prepare students for careers in STEM.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	cell structure and transport, cell division, organization and the digestive system, organizing animals and plants	• Structure of animal and plant cell • Cell specialization • Cell differentiation • Stem cells • Therapeutic cloning • Meristem • Prokaryotic and eukaryotic cell • Mitosis and the cell cycle • Diffusion • Osmosis • Active transport • Principles of organizing plants and animals • Cells, tissue, organs, organ system, organism • Structure and function of the digestive system • Enzymes • Human digestive enzymes • Chemistry of food • The heart and blood vessels • Artificial pacemaker • Adaptation of the lungs for gaseous exchange • Arteries, veins, capillaries • Coronary heart disease • Stents • Statins • Artificial heart • Blood components • cell, tissue, organ and organ system in plants	**Practical and enquiry skills:** observe prepared slides of specialised cells **Practical and enquiry skills:** observe cells under the microscope **Practical and enquiry skills:** Investigate osmosis and diffusion **Scientific Communication**: Model osmosis, diffusion and active transport **Practical and enquiry skills:** make 3D models of prokaryotic and eukaryotic cells **Scientific Communication**: make models of mitosis **Practical and enquiry skills:** conduct food test **Practical and enquiry skills:** Observe prepared slides of smears, capillary, vein, artery **Communication**: research coronary heart disease, stent, pacemaker, statin, **Practical and enquiry skills:** investigate rate of transpiration in plants	**Teacher**: End of Unit test, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models

			Scientific Communication: make presentation on coronary heart disease **PSHE/RSE** • **Research on coronary heart disease, stent, pacemaker and Statin** • **Research on the effect of diet and exercise on cardiovascular diseases** **Careers** • **Springpod Virtual work Experiences** • **STEM Toolkit** • **Homework on STEM careers in Histology, nutrition, phlebotomy, general health and fitness.**	
Autumn 2	Atomic structure, the periodic table, structure and bonding, chemical calculation Chemical change, electrolysis and energy changes,	• Define atom, element, compound mixture • Use scientific conventions to identify elements by chemical symbol • Write word and chemical equations • Theories of the atom and how new evidence may cause change or replacement of model • State the relative mass and charge of the subatomic particles • The electronic structure of an atom • The arrangement of the periodic table • Properties and trend of elements in groups and period of the periodic table • Covalent, ionic and metallic bonding • Electrostatic and intermolecular forces • Giant ionic structures • Giant covalent structures • Law of conservation of mass • Relative formula mass • Relative formula mass	**Practical and enquiry skills:** Make models of atoms, elements, compounds **Practical and enquiry skills:** Conduct experiments using separating techniques **Scientific Communication**: Make 2D or 3D model to represent past and present atomic model **Scientific Communication**: Make tables to represent the atomic mass and relative atomic mass of an elements **Communication**: Role play the electronic structure of an atom **Scientific Communication**: Make models showing giant covalent and ionic structures	**Teacher**: End of Unit test, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models

		• Calculating masses of reactant and product • Calculating concentration of a solution • Reaction of metals with oxygen • Oxidation and reduction reaction in terms of loss or gain of oxygen • The reactivity series of metals • Extraction of metals by reduction • Electrolysis • Extraction of metals by electrolysis • Electrolysis of aqueous solution • Acid, base and alkali • Reactions of acids with metals, bases and alkali • Neutralisation reaction • The ph scale • Strong and weak acids • Structure of animal and plant cell	**Practical and enquiry skills:** Conduct experiment to react magnesium with oxygen **Practical and enquiry skills:** Measure out 1 mole of an element or a compound Teacher Demo of the reaction of metals with water to infer the order of reactivity **Practical and enquiry skills:** Investigate the electrolysis of solution **Practical and enquiry skills:** Investigate acid metal reaction **Practical and enquiry skills:** investigate neutralization reactions	
Spring 1	Communicable diseases, preventing and treating diseases, non-communicable diseases, photosynthesis, respiration	• Communicable diseases • Pathogens • Human defense system • The white blood cell role in fighting infection • Vaccination • Antibiotic • Pain killers • Drug development • Double blind trial • Health • Non-communicable diseases • Cause of non-communicable disease • Risk factors • Causal mechanism • Cancers • Photosynthetic reaction • Equation of photosynthesis • Rate of photosynthesis • Limiting factors • How plants use glucose • Aerobic respiration • Aerobic respiration as an exothermic reaction • Organisms need for energy	**Scientific Communication**: Use models to represent phagocytosis and antibody **Scientific Communication**: Carry out research and explain application of science and personal and social implications related to diseases. **Scientific Communication**: research the development of vaccine by Jenner and discuss the ethical implication **Scientific Communication**: use graph to analyze immunity **Scientific Communication**: use model to explain herd immunity **Scientific Communication**: research on tumor **Practical and enquiry skills:** investigate photosynthesis and factors that affect the rate of photosynthesis	**Teacher**: End of Unit test, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models

		• Equations for aerobic respiration • Anaerobic respiration in animals, plants and yeast • Equations for anaerobic respiration in animals, plants and yeast • Response of the body to exercise • Metabolism • Metabolic reaction in plants and animals • The liver and metabolism	**Practical and enquiry skills:** investigate fatigue caused by anaerobic respiration **Practical and enquiry skills:** investigate anaerobic respiration in yeast **Scientific Communication**: investigate the effect of exercise on breathing and pulse rate **PSHE/RSE** • **Research on how the different sexually transmitted infection are transmitted and how they can be reduced through safer sex and testing** • **Brookes Education sexual health and sexual orientation workshop** • **Analyse case study and data on STI prevalence, their impact and treatment.** • **Young Hillingdon alcohol awareness workshop** • **Analyse graph showing the correlation and causal mechanism of the risk factors for non-communicable diseases** • **Case study on the effect of diet and exercise on preventing non-communicable diseases** **Careers** • **Springpod Virtual work Experiences** • **STEM Toolkit** • **Research on STEM careers in oncology, NHS, Pharmacy, Pharmacology, Biomedical sciences , distillery**	

Spring 2	Conservation and dissipation of energy, energy transport by heating, energy resources, electric circuits,	• Energy stores • Changes in energy store • Calculating work done by a force • Calculating kinetic energy, gravitational potential energy and kinetic energy • Calculating the change in distribution of energy in a system • The specific heat capacity of a substance • The power rating of an appliance • Calculate the power of a device • The law of conservation of energy • Useful and wasted energy • Efficiency • Calculating efficiency • Energy resources • Renewable and non-renewable energy resources • Circuit symbols • Electric current • Current in series • Resistance • Potential difference, resistance and current equation • Ohms law • Current potential difference graphs • Series and parallel circuits • Current, PD and resistance in series and parallel circuits	**Scientific Communication**: Plan experiments to investigate gravitational potential energy store, kinetic energy store and elastic potential energy store **Practical and enquiry skills:** Investigate the law of conservation of energy, closed and open system using PHET simulations **Practical and enquiry skills:** Investigate the specific heat capacity of a metal **Scientific Communication**: use scientific knowledge of specific heat capacity to design a building **Scientific Communication**: make posters and brochures on the advantages and disadvantages of energy resources **Practical and enquiry skills:** construct circuits using circuit kits and PHET simulation **Practical and enquiry skills:** Investigate current in series and parallel **Scientific Communication**: draw circuit diagrams to represent a circuit **Practical and enquiry skills:** Investigate current and resistance relationship **Careers/Enrichment** • **Springpod Virtual work Experiences** • **STEM Toolkit** • **Research on STEM careers in energy, transport, electrical engineering, electrical installation and transport**	**Teacher**: End of Unit test, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models
Summer 1	Electricity in the home, Molecules and matter, radioactivity, forces in balance, motion	• Direct current and alternating current • The mains electricity supply • The name and colour code for electric wires • Electrical power	**Practical and enquiry skills:** use an oscilloscope to investigate alternating and direct current	**Teacher**: End of Unit test, kerboodle test and quiz

		• Equation for electrical power • Energy transfer in everyday electrical appliance • Work done when charge flows • Equations to calculate electrical energy • The national grid • Density • Equation for density • The particle model of matter • Change of state • Chemical and physical change • Internal energy • Heating and temperature • Specific latent heat • Particle model of matter and motion of gas • Temperature and pressure • Size and structure of an atom • Proton, neutron and electron of an atom • Scientific models of the atom • Changes in scientific models of the atom • Radioactive decay • Types of nuclear radiation • Penetrating power of alpha, beta and gamma radiation • Nuclear decay equation • Half life • Irradiation • Safety precaution when dealing with radioactivity	**Practical and enquiry skills:** put together and electric plug and socket using the colour code **Scientific Communication**: make model of the national grid **Practical and enquiry skills:** investigate the density of regular and irregular objects **Practical and enquiry skills:** investigate chemical and physical change **Scientific Communication**: use diagrams to explain states of matter and density **Practical and enquiry skills:** investigate the heating curve of water **Practical and enquiry skills:** investigate latent heat **Scientific Communication**: make model of an atom **Scientific Communication**: Make model to demonstrate the various theories proposed of an atom **Scientific Communication**: Model the gold leaf electroscope experiment **Practical and enquiry skills:** Flip coin to demonstrate the randomness of radioactive decay **Scientific Communication**: simulate half life **Scientific Communication**: use graphical models to determine half life **Communication**: represent the motion of objects on graphs **Practical and enquiry skills:** Design a parachute for free falling object	**Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models

			Careers • **Springpod Virtual work Experiences** • **STEM Toolkit** • **Research on STEM careers in engineering, nuclear physics, radiology**	