SCIENCE

Year 9

What are the aims and intentions of this curriculum?

Entry level Science is taught at the Parkside Studio College as a pre-requisite to AQA combined Science Trilogy. 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 practical assessments will allow students to have an understanding of the scientific method as well as develop their practical investigative skills.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	Biology -What is the body made of? -How the body works -How the body fights disease -How the body is coordinated The human Skeletal system	Nucleus, ribosomes, stem cell, specialised cell, mitochondria, cytoplasm, cell membrane Red blood cell, white blood cell , platelet, plasma, organ, organ system Diffusion, osmosis, concentration gradient, concentration, enzyme, respiration Aerobic respiration, anaerobic respiration, correlation, fermentation Pathogen, vaccination, immunity Placebo, double blind trail, effective, efficacy, dosage, reflex action Hormones, menstrual cycle, contraceptive	**Scientific communication skills:** • Use scientific vocabulary correctly. • Recap knowledge of animal cells from the KS3. • Label a simple diagram of an animal cell. • Draw/ label specialised animal cells showing their specific features and what they are used for. • Card sort to relate structure to function of animal cells. • "What am I?" guessing game to consolidate knowledge. • Card sort cell, tissue, organs, systems using pictures. • Cut and stick organs onto 'empty' torso. • Organ 'Bingo'. • Draw/label diagrams of blood cells. • Label a diagram of the digestive system. • Create a digestive system word search and test it on other students. • Model for digestion using popper beads to illustrate how larger molecules are broken into smaller ones. • Word- spot key vocabulary from the BBC Bitesize videos. • Discuss the difference between respiration and breathing. • Card sort the words for the respiration equation. • Brainstorm energy- giving foods in day-to-day diet. • Use the thermograms pictures to show infra-red radiation given off by living things. • Discuss good and poor lifestyle choices. • Research one of the links to produce an information leaflet/PowerPoint and feed back to the class.	**Teacher**: Internal assessments, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet , portfolio, assignment, presentations, models External assessment

			• Discuss how being under or overweight can affect a human's health. • Watch BBC video clip on microorganisms list the pathogens. • Talk about infection and what it means. Look at pictures of bacterial cells and viruses. • Use ABPI clip and produce story board of sequence. • Role play parts from the Jenner clip to look at the views of the boy and his mother and consider ethics of Jenner's work. • Draw up a personal vaccination history. • Debate the idea of anti- vaccination campaign groups. • Discuss drug safety and how drugs are tested today. • Use cards/cut-outs to sequence the stages in drug testing and trialing and explain the purpose of each stage. • Discuss the safety issues of growing microorganisms in a lab. • Label the main endocrine glands on an outline of the body. Complete table to show the main hormones and target organs. • Watch the BBC clip about the menstrual cycle and discuss the stages. • Use a month calendar page to colour code days according to hormone levels and changes. • Discuss the pros and cons of hormonal contraception. • Discuss the implications of IVF treatment for a couple wanting a baby. • Discuss possible causes of infertility in men and women and treatments available. Practical and enquiry skills: • Correctly use a microscope to observe prepared slide under different magnifications. • Prepare a sample of human cells from a basic cheek swab. • Demo: model heart. • Observe blood smear under the microscope. • Use Youtube computer simulation to show flow of blood. • View slides of various digestive system tissues under the microscope	

- Observe changes from savoury to sweet as a plain bread is chewed.
- Compare the carbon dioxide content of inhaled and exhaled air using limewater.
- Demonstrate water vapour production by clouding a mirror with exhaled breath.
- Compare graphs showing death rates from diseases pre and post vaccination campaigns.
- Research some traditional drugs example digitalis and make a poster or presentation about them.
- Research a disease caused by incorrect hormone levels example diabetes

PSHE/RSE

- Make charts on the various food group required for a balanced diet
- Create menus to promote a balanced diet
- Calculate BMI and analyze data to determine if an individual is overweight, underweight or healthy
- External agency will present on contraception and healthy sexual choices
- Research on the effects of drugs and tobacco smoking on physical and mental wellbeing.

TDA (Teacher- devised assignment) opportunity:

- Compare the energy released by burning different foods example low-fat crisp or rice cake and normal one.
- Investigate the effect of exercise on pulse rate.
- Investigate the effect of caffeine drinks on pulse rate.
- Use of pre-inoculated agar in Petri dishes to evaluate the effects of disinfectants and antibiotics.
- Comparing different peoples' reaction time using the catch response with a ruler or a reaction time programme.

Career/ Enrichment opportunities:

- **Centre of the Cell**
- **Science Museum**
- **Natural History Museum**
- **STEM at Brunel University**

Autumn 2	Chemistry -Atoms, elements and compounds -Mixtures and compounds -Metals and alloys	Atom, element, compound, period, Groups, chemical reaction Proton, Neutron, electron, relative atomic mass, relative formula mass, atomic number, atomic mass, Isotope, solid, liquid, gas, condensation, evaporation, boiling, freezing, melting Filtration, distillation, crystallisation, chromatography' monomer, polymer, allotropes, formulation, biodegradable, solute, solvent, solution Covalent bond, ionic bond, ionic compound, ion, alloy, ores, displacement reaction, reactivity series, molecule Finite resources, sustainable resources, renewable resources, non-renewable resources, electrolysis cathode, anode, electrolyte displacement reaction	**Scientific communication skills:** • Use scientific vocabulary correctly • Periodic Table Bingo • Write word equations for the reactions of metals and non-metals and the formation of oxides from non-metals. • Take and record accurate measurements. • Use Molymod structures to construct and describe the different forms of carbon. • Research the different uses of graphite and diamond. • Draw and/or label apparatus correctly. • Measure Rf accurately and record results in an appropriate table. • Limestone inquiry role play. • Write a letter to example school council to explain why drinks cans should be recycled in school. • Research the MP of common metals and present as a table using correct units. • Producer a poster of the metals and alloys used in our everyday lives. • Use Scientific vocabulary correctly: the common names poly (ethene), polystyrene and PVC are acceptable. Other polymer names are not required. • Produce a poster to show modern uses of polymers and the materials they replaced in those roles.	**Teacher**: Internal assessments, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models External assessment
Spring 1	Physics -Energy -Forces and work -Speed and stopping distances -Atoms and nuclear radiation	Kinetic energy, chemical energy, gravitational potential energy, energy store, conservation of energy, thermal conductor, insulator, hydroelectricity, wind turbine Efficiency, useful energy, wasted energy, renewable energy resource, non- renewable energy resource, friction, contact force, non-contact forces, force, work, power, Watt Speed, velocity, acceleration, braking distance, thinking distance, stopping distance Alpha radiation, beta radiation, gamma radiation, electromagnetic waves, ionising radiation, irradiation, half life	**Scientific communication skills:** • Use scientific vocabulary correctly • Discussion to identify 'useful' and 'wasted energy' changes. • Sequence instructions to carry out an investigation into factors affecting rate of cooling • Use IT to research the advantages and disadvantages of different energy resources. • Discuss/debate the advantages and disadvantages of different types of energy resources. • Discuss everyday activities in terms of the forces involved and identify these as 'push' or 'pull'.	**Teacher**: Internal assessments, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment, presentations, models

			Practical and enquiry skills: • Circus (real or virtual) of everyday devices in use example kettle, hairdryer, vacuum cleaner • Compare cooling of drinks with lid on/off. • Demonstrate electricity generation by building models of windmill (using hairdryer) or water mill to turn a turbine and generate a voltage. • Investigate the relationship between the distance from a light source and a solar (photoelectric) cells on the voltage generated. • Use newton meters to experience a range of pushes/ pulls for lab/everyday objects • Attraction/repulsion of magnets; attraction of magnetic materials example paperclips/iron filings • Research uses and dangers of radioactivity. TDA (Teacher- devised assignment) opportunity: • Investigate factors that affect the rate of cooling of a container of water example surface area, initial temperature, types of insulation, colour of the container. • Investigate the thermal conductivity of different materials example which is better for a saucepan handle: wood or metal? • Investigate how different surface affect the amount of friction on a moving block. Investigate how the speed of a trolley (or model car) changes as it rolls down a slope. Investigate factors that affect human reaction time example tiredness, distraction, practice. PSHE/RSE • Analyse case study on the effect of alcohol on thinking distance and stopping distance and how it relates to motor vehicle accidents. **Career/ Enrichment opportunities:** **The Science Museum** **Springpod work experience**	External assessment

Spring 2	Chemistry -Reactions of acids -Energy and rate of reaction -Fuels and the atmosphere -Water for drinking	Catalyst, collision, rate of Chemical reaction, acids, base, alkali, neutralisation reaction, combustion, oxidation Endothermic reaction , exothermic reaction, activation energy, catalyst Combustion, incomplete combustion, acid rain, global warming, global dimming, particulates, global warming, greenhouse effect Carbon foot print, cracking, potable water, chromatography, filtration	**Scientific communication skills:** • Use scientific vocabulary correctly. • Write word equations using the correct terms and structure. • Record experimental measurements in an appropriate table using headings and units. • Write the word equation for photosynthesis. • Use a pie-chart to show the composition of the Earth's atmosphere. • Card sort to match fractions with their uses. • Research and discuss the impact of burning fossil fuels on the environment. • Research and discuss the use of carbon monoxide monitors in the home. • Discuss the effects of increased atmospheric temperature on global warming. • Order information to produce aa flow chart to show the purification of water. **Practical and enquiry skills:** • Investigate the reactions of magnesium, zinc and iron with hydrochloric and sulfuric acids. • Carry out the 'pop' test for hydrogen produced in these reactions. • Investigate the neutralisation of acids by bases, alkalis and carbonates. • Carry out the limewater test for carbon dioxide. • Produce solid salt crystals by evaporation of a salt solution. • Investigate the temperature changes that take place in combustion, oxidation and neutralisation reactions. • Investigate the temperature changes when ammonium chloride dissolves in water or citric acid reacts with sodium hydrogen carbonate. • Compare prepared samples of fractions from crude oil. • Observe a demonstration of fractional distillation of prepared crude oil sample. • Investigate the products of combustion. • Compare 'roaring' and 'safety' Bunsen burner flames. • Investigate the production of acid rain (spray a large cotton wool 'cloud' with water; hold above burning matches; squeeze the 'cloud' over a UI solution).	**Teacher**: Internal assessments, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet , portfolio, assignment, presentations, models External assessment

			• Distilled a salt water solution to produce fresh water. TDA (Teacher- devised assignment) opportunity: • Investigate the amount of hydrogen produced when acids react with different metals. • Investigate how to make a chemical reaction go faster. • Investigate the production of oxygen by aquatic plants in different conditions by counting bubbles. • Compare the amount of carbon dioxide in fresh air and exhaled air. • Compare the amount of soot produced when burning different fuels. • Investigate the amount of dissolved solids in water from different locations by evaporating samples and weighing residues. **Career/ Enrichment opportunities:** **Thames water virtual tour** **Springpod virtual work experience**	
Summer 1	Physics -Electric current -Domestic electricity -Magnetism and electromagnetism -Different types of waves -Electromagnetic waves	Ohms, current, Joule, voltage, potential difference, battery, ammeter, voltmeter, cell. alternating current, direct current, resistance, voltmeter Resistor, diode Light dependent resistor, thermistor, series circuit Parallel circuit, earth wire	Scientific communication skills: • Use scientific vocabulary correctly to describe or build a simple circuit. • Use scientific vocabulary correctly, including the units for frequency and voltage. • Interpret information about current ratings to choose the correct fuse for an appliance. • Discuss relative energy usage of different everyday appliances. • Use scientific vocabulary correctly to explain the differences between wave types.	**Teacher**: Internal assessments, kerboodle test and quiz **Self**: Past paper question, worksheet, project **Peer**: Class worksheet, portfolio, assignment,

			• Use a mnemonic to remember the order example; Grandma X's Umbrella Vanishes In Mild Rain (gamma-radio waves) OR Remember My Instructions Visible Using X-ray Glasses (radio waves- gamma) • Design a poster to explain the risks of unprotected sun exposure/tanning beds. • Use optical fibre to send a message using Morse code. **Practical and enquiry skills:** • Build series circuits to measure current through a variety of components. • Compare the pattern shown on an oscilloscope for d.c. and a.c. supply. • Wire a standard 3 pin plug correctly. • Investigate how fuse wire melts when the identified current is exceeded. • Reading of meters to produce meaningful and valid observations. • Comparison of the energy usage of small household electrical appliances using a joulemeter. • Identify the N and S poles of bar magnets using a suspended magnet to show attraction and repulsion. • Use a compass to identify the field pattern around a single and then paired bar magnets. • Construct a 'magnetic toy' of floating magnets using circular 'holed' magnets and wooden base and rod. • Use a plotting compass to identify the magnetic field round a current- carrying wire. • Investigate how the strength of an electromagnet changes. • Research uses of electromagnets. • Class 'Mexican wave' demonstration. • Practical demonstrations: Slinky (longitudinal) Rope (transverse) Bell in (evacuated) jar • Demonstrate wave shapes using oscilloscope. • Use oscilloscope, frequency generator, loudspeaker to relate frequency to changes in pitch and relate amplitude to changes in volume.	presentations, models External assessment

			• Circus of exemplars of e-m radiation example radio; microwave oven; infra-red heater; toaster; light source and prism; UV light and tonic water; UV-visible pens; sample X-ray. • Investigate microwaves to find which materials block them (example apple). • Investigate light travelling down an optical fibre over a distance (fishing line is a suitable but unshielded alternative). TDA (Teacher- devised assignment) opportunity: • Investigate which materials are the best electrical conductors. • Investigate factors that affect the strength of an electromagnet. • Testing visual acuity in different colours of light. • Investigate the shielding of a mobile phone or remote control device. • Investigate the range over which a Bluetooth device is effective.	