Year 10-11 Curriculum skeleton – Trilogy Science

		Biology		Chemistry		Physics	
		Year 10	**Year 11**	**Year 10**	**Year 11**	**Year 10**	**Year 11**
Autumn 1	**Focus**	**Photosynthesis**	**Ecology and Homeostasis**	**Structure and Bonding**	**Using resources**	**Energy and The National Grid**	**Forces**
	Theory	Explain the structure and function of plants and relate this to the process of photosynthesis.	Describe the impact humans have on the environment. Explain how information is transferred through the body using the nervous system.	Draw and explain ionic, covalent and metallic structures. Relate their structures to their uses and properties. Understand the uses and properties of nanoparticles.	Explore the relationship between the earth's natural resources and chemistry.	Explain what energy systems and energy stores are. Compare renewable and non-renewable energy resources	Investigate forces and their interactions including resultant forces, weight and elasticity.
	Required Practical	Investigate how different limiting factors affect the rate of photosynthesis.	Investigate the reaction time of a subject.		Purify water samples by distillation or pH or dissolved solids.	Investigate the specific heat of a copper block.	Investigate hooks law – the extension of a spring
	Skills	Record the rate of photosynthesis whilst taking into account different sources of error. Understand that different variables can be investigated. Draw and interpret a line graph. Calculate means and inverse square law as well as identify anomalous data.	Measure the reaction time, comparing 2 different methods. Identify the pros and cons of each method including the sources of error and understand that different variables can be investigated. Calculate a mean from the result as well as identifying anomalous results	Understanding and drawing diagrams to model electron behaviour in bonding. Evaluation of strengths and limitations of bonding models. Link structures to their properties and uses. Use standard form to express small numbers and link this to nanotechnology. Calculate surface area and volume. Understand the applications of nanotechnology in society.	Be able to carry out simple comparative LCAs for plastic and paper bags. Relate the properties of materials to uses. Evaluate data about resources and extraction methods. Recall steps to produce potable water and treat waste water.	Record the temperature increase of a copper block using continuous data collection. Draw a graph from the results and use this to calculate the specific heat capacity using the equation. Be able to rearrange equations.	Accurately record the length of a spring whilst considering potential errors. Plot force-extension graphs.
Autumn 2	**Focus**	**Organisation**	**Homeostasis**	**Chemical Changes**	**Organic Chemistry**	**Energy and national grid and Electricity**	**Forces and Motion**
	Theory	Describe the three different types of cell transport.	Explain how chemical messengers transfer information using glands and hormones as part of the endocrine system.	Study chemical reactions and patterns of metal reactivity, acids and bases. Make predictions about behaviour based on knowledge of the reactivity series.	Learn about the structures, properties and uses of carbon-based compounds.	Investigate energy efficiency and how energy is distributed. Investigate the difference between series and parallel circuits.	Describe motion along a line. Investigate acceleration and Newtons 3 laws and momentum including stopping distances.
	Required Practical	Investigate osmosis in plant tissue (potato).		Investigate the variables that affect temperature changes in acid plus metals, acid plus carbonates, neutralisations and displacement of metals. Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate.		Use circuit diagrams to set up and check circuits to investigate the factors affecting the resistance of electrical circuits in series and parallel. Investigate the resistance of a wire when you change the length of the wire.	Investigate how force and mass affect acceleration.

	Skills	Calculate the percentage mass change of potato in different solutions and identify sources of error. Draw graphs with negative axis and use a line of best fit to extrapolate data. Calculate surface area to volume ratio and apply this to exchange surfaces.	Describe the different glands in the human body and their locations. Explain how these hormones control functions in the body and what happens when these hormones fail.	Link chemical patterns and observations to the reactivity series. Understand pH scale and the advantages of other indicators. Describe how to investigate temperature changes. Identify opportunities to improve accuracy. Plot and interpret bar charts and line graphs. Describe how to prepare salts from different chemicals and be able to explain the advantages of the stages used.	Balance combustion equations. Recognise structures, models and formulae of alkanes. Explain how fractional distillation and cracking works. Link properties of hydrocarbons to fractional distillation and usefulness to society.	Measure current, potential difference, and resistance in parallel and series circuits. Be able to rearrange the formulas to calculate resistance. Calculate the resistance of a wire by measuring the current and potential difference of a wire at different lengths. Plot a line graph from the results collected.	Observe the effect of force on a object. Consider errors that may arise during the investigation. Know the correct equation to calculate acceleration.
Spring 1	**Focus**	**Organisation and Cell Biology**	**Genetics and Variation**	**Chemical Changes**	**Chemical Analysis**	**Electricity**	**Waves**
	Theory	Describe the digestive system including the role of enzymes, circulatory and respiratory systems. Describe cell structure and function, cell division and respiration	Explain the role of DNA and how genes are passed onto the next generation Describe how organisms vary and what causes these variations	Using the reactivity series to predict products of molten and aqueous ionic electrolytes. Understand and describe redox reactions during the process of electrolysis. Link electrolysis to metal extraction.	Describe qualitative tests to detect specific gases. Understand the difference between pure and impure substances. Learn about examples of formulations in everyday life.	Understand the relationship between current, resistance and potential difference and charge as well as describe the features of mains electricity including energy and power.	Compare waves in air, fluids and solids. Describe the properties of electromagnetic waves. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.
	Required Practical	Investigate the effect of temperature on enzymes Use different reagents to identify different food groups. Use a microscope to observe and identify different cell structures.		Investigate what happens when aqueous solutions are electrolysed using inert electrodes.	Use paper chromatography to separate different soluble substances.	Use circuit diagrams to construct circuits to investigate the I–V characteristics of a variety of circuit elements.	Observe and measure the frequency, wavelength, and speed of waves in a ripple tank and waves in a solid.
	Skills	Using continuous sampling technique investigate the effect of temperature on enzymes. Use graphs to determine the optimum enzyme activity. Using different reagents to determine food groups. Take into account the safety precautions for the different reagents and the difficulty of colour being subjective and not a precise result. Make a temporary slide and use a light microscope to observe cells and produce labelled scientific drawings. Use standard form and be able to convert units into micrometres.	Use models to explain how genetic information is passed on from one generation to the next. Use Punnet squares to calculate the probability of inheriting certain traits. Compare continuous and dissentious data.	Describe how to electrolyse ionic compounds. Use knowledge of electrolysis and the reactivity series to predict the products of solutions. Use gas tests for hydrogen, oxygen and chlorine electrode products. Be able to balance half redox equations.	Describe how chromatography separates mixtures and identify potential errors in methods. Be able to interpret chromatogram results and calculate Rf values to an appropriate number of significant figures. Use melting point and boiling point data to distinguish pure from impure substances.	Use circuit diagrams to construct and check series and parallel circuits including a variety of common circuit elements such as filament light bulbs. Construct line graphs to show how the resistance changes as current increases.	Observe waves in fluids and solids and measure speed, frequency, and wavelength. Consider errors that may occur and different methods to take these measurements. Be able to rearrange equations to make different values the subject. Interpret wave diagrams.

Spring 2	**Focus**	**Health Matters**	**Evolution**	**Quantitative Chemistry**	**Earth and atmosphere**	**Atomic Structure**	**Magnets and Electromagnets**
	Theory	Explain the difference between health and disease including looking at risk factors. Explain patterns in diseases incidences.	Explain Darwin's theory of evolution and how we classify living organisms. Understand how to read an evolutionary tree.	Apply ideas about conservation of mass to experimental data. Understand formula, subscripts and multipliers to balance equations. Use relative formula mass to calculate the mole in a given mass. Use the mole to calculate amounts and change the subject of the equations to solve problems in reactions. Calculate concentration of solutions.	Describe key events in the early and current earth's atmosphere. Explain the causes and effects of climate change and the limitations of models.	Describe the structure including subatomic particles including isotopes and how the atom has developed over time.	Describe permanent and induced magnetism, magnetic forces and fields including electromagnets and their uses.
	Required Practical						
	Skills	Understand the difference between cause and correlation. When sampling data, know what valid data looks likes. Interpret graphs to explain disease incidences.	Use models to explain the theory of evolution. Evaluate evidence and know what makes scientific theories valid.	Give answers using standard form and to the correct number of significant figures. Recall and rearrange expressions to change the subject. Successfully convert units e.g. cm^3 to dm^3	Understand the limitations of theories about the earth's early atmosphere and be able to link key events to the gases carbon dioxide and oxygen. Evaluate the quality of evidence in a global climate change report. Describe uncertainties and the importance of peer review.	Calculate half-life and complete half equations. Use graphs to predict the half-life of a radioactive source.	Be able to use Fleming's left-hand rule and manipulate equations to make different values the subject.
Summer 1	**Focus**	**Health Matters and Ecology**	**Revision**	**Energy Changes**	**Revision**	**Atomic Structure and Particles**	**Revision**
	Theory	Explain how immune response and vaccinations protect the population Describe the habitat and how organisms depend on each other linking to interdependence and adaptations.		Identify and describe energy changes in chemical reactions. Calculate breaking and formation of bonds.		Describe what radioactive decay and nuclear radiation is including hazards and how it can be reduced. Describe the changes of state linking to the particle model including pressure in gases and specific latent heat.	
	Required Practical	Investigate the distribution of organisms using quadrats and transects		Investigate temperature changes in neutralisation reactions. Draw and describe intersecting graphs. Use graphical data to identify neutralisation.		Investigate the specific heat of a copper block.	

	Skills	Be able to explain graphs for antibody production. Be able to compare different microorganisms and diseases. Describe the features that make up an ecosystem and how they all interact with one another. Use transect and quadrats to sample habitats. Handle the data by completing means, modes, medians and range and be able to estimate population abundance.		Identify endothermic and exothermic reactions from data. Recall and rearrange equations to calculate bond energies. Draw and label reaction profiles. Describe how to investigate temperature changes in neutralisation and be able to identify possible sources of error. Plot and interpret bar charts and line graphs.		Record the temperature increase of a copper block using continuous data collection. Draw a graph from the results and use this to extrapolate the specific heat capacity using the equation. Be able to rearrange equations.	
Summer 2	**Focus**	**Ecology**	**Exams**	**Rates of Reaction**	**Exams**	**Particles**	**Exams**
	Theory	Describe how the environment changes including both the water and carbon cycle		Know which factors which affect reaction rates and be able to explain them in terms of collision theory and their effect on dynamic equilibrium. Identify catalysts in reactions and explain their effect on rate. Draw and interpret graphs and data linked to the rate of a chemical reaction. Understand the link to industrial reactions and the need for compromise.		Investigate the density of different materials.	
	Required Practical			Investigate how changes in concentration affect the rates of reactions by either measuring the volume of a gas produced or a change in colour or turbidity.		Calculate the density of regular shapes, irregular shapes, and liquids.	
	Skills	Describe the impact that humans have on the environment and what we can do to reduce the impact.		Describe how to investigate rates of reaction by measuring product formation e.g. loss of mass, measuring cylinders, gas syringes and formation of a precipitate. Calculate means from repeat data. Drawing and interpreting rate graphs with proportional and inversely proportional relationships. Using tangents and gradients to calculate rates. Drawing reaction profiles for catalysed reactions.		Rearrange the equation for density to make other values the subject. Explain how to measure the density of different shaped objects. Explain the errors that may be encountered during the investigation.	