KAA Curriculum Overview	Science	Year 10	EOY Exam	Sequencing and Progression	
Rationale *Give an overview of what students are studying this year and why. Link directly to your overall curriculum intent.* Students start their GCSE science course this year. In physics, students will study energy and electricity. In biology, students will infection and response, bioenergetics and homeostasis. In chemistry, students will study quantitative chemistry, reactions and organic chemistry. The curriculum will give the students both substantive and disciplinary knowledge that they need to understand and explain phenomena that they experience in their everyday lives. The students will know more and be able to explain more over time. They will also be encouraged to think for themselves and to be curious and analytical as they look at experimental data.			*What content and skills will be assessed in the EOY exam?* Students will be assessed in the form of 3 full paper 1 GCSE combined science exams	*How does this year build on what they've learnt last year?* -Directly links to each biology, chemistry and physics topic taught at KS3	*How will it benefit them as they move forward next year?* This curriculum builds on the year 9 core principles and focusses on topics in more detail. In year 11, students will apply knowledge from year 10 with increasing demand from the content.
Term	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Sum 1**	**Sum 2**
Link to MTP Overview	Aut1 MTP					
Topic studied & Fertile Question	GCSE Biology: Infection and response & Bioenergetics	GCSE Chemistry: Quantitative Chemistry, Chemical Reactions & Energy Changes	GCSE Physics: Energy & Energy Resources	GCSE Biology: Homeostasis and response	GCSE Chemistry: Organic Chemistry, Analysis & the Earth's Resources	GCSE Physics: Electricity
Adjustments following last assessments / evaluation.	None	None	None	None	None	None
Key knowledge and skills students need to have gained by the end of the unit	**Knowledge** Infection and response - Defining a pathogen and identifying the four pathogens: bacteria, virus, protist, fungi - Diseases caused by viruses, bacteria, fungi and protist. -Structure of eukaryotic (plant and animal) and prokaryotic cells - Transmission of pathogens - non-specific human defence systems: first lines of defence - Specific human defence system: antibody production and antitoxin production - vaccination and herd immunity - Antibiotics versus painkillers - Discovery and development of drugs - Clinical trials and ethics Bioenergetics - Equation for photosynthesis - Photosynthesis is an endothermic reaction - Factors which affect the rate of photosynthesis	**Knowledge** Quantitative chemistry - Defining the conservation of mass and using the concept to balance chemical equations. - Defining relative formula mass (RFM) and using the periodic table to calculate the RFM of compounds. - The production of gas can reduce the mass of products in an open system, as it is lost to the surroundings - Estimate uncertainty - Calculate moles using mass/mr - 1 mole of a substance in grams is equal to its RFM - 1 mole of substance contains 6.02 x 10^{23} particles (Avogadro's constant). - Calculating reacting masses using balanced symbol equations - Limiting reagents and reactants in excess. - Using balanced symbol equations to identify the limiting reactant. - Calculating concentrations in g/dm^3.	**Knowledge** -Energy stored in a system can change when the system changes - Energy stores include: GPE, kinetic energy, electrostatic, thermal, elastic, nuclear, and chemical. - Energy transfers: heating, forces, current. - Difference between energy stores and transfers. - kinetic energy = 0.5 × mass × $(speed)^2$. elastic potential energy = 0.5 × spring constant × $(extension)^2$ - g . p . e . = mass × gravitational field strength × height - change in thermal energy = mass × specific heat capacity × temperature change -power = energy transferred/ time - Energy is not created or destroyed it is transferred between the system and surroundings. - Efficiency = useful output energy transfer/ total input energy transfer	**Knowledge** - Define homeostasis - Describe how homeostasis maintains the bodies internal conditions - The structure of the nervous system and how it is adapted to its function. - The reflex arc and its automatic response - Human endocrine system and its role - Human endocrine system as a network of glands which secrete hormones directly into the bloodstream to reach target organs. - Identify the position of the: pituitary gland, pancreas, thyroid, adrenal gland, ovary and testes. - Control of blood glucose concentration by the pancreas - Type 1 and 2 diabetes and its treatment - Hormones in reproduction - The menstrual cycle - Contraception	**Knowledge** Organic - Crude oil as a finite resource formed from the remains of ancient biomass - Alkanes and their properties - Fractional distillation - Cracking – steam and catalytic and the conditions required - Properties of hydrocarbons: boiling point, viscosity, flammability Chemical analysis - Pure substances - Formulations and examples - Chromatography and calculating Rf values - Test for common gases: Hydrogen, oxygen, carbon dioxide, chlorine	**Knowledge** - Use circuit symbols to draw series and parallel circuit diagrams - Describe the difference between series and parallel circuits and how the current and potential difference varies. - Current is the rate of flow of charge measured by an ammeter. - Charge flow = current x time - Potential difference = current x resistance - Draw graphs to show resistance from LDR, lamp and a resistor at constant temperature - Resistance in series versus parallel - Direct and alternating current - Mains electricity and the 3 pin plug.

	- Uses of glucose from photosynthesis - Aerobic vs anaerobic respiration - Products of anaerobic respiration in humans, plants and yeast cells - Response to exercise. How the human body reacts to the increased demand for energy - Metabolism **Skills** <u>Infection and response</u> - Evaluation of data presented in graphs and tables looking at global use of vaccinations to prevent disease. - Interpreting clinical trials graphs and data <u>Bioenergetics</u> - Measure and calculate the rates of photosynthesis - Extract and interpret graphs of photosynthesis rate involving 1 limiting factor - **RP5:** Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	<u>Chemical changes</u> - Using various experiments to identify the reactivity series (metal + acid, metal + water, metal carbonate + acid, metal oxide+ water) - Define oxidation and reduction in terms of gain of oxygen/loss of oxygen and loss of electrons/gain of electrons - Use the reactivity series to identify methods of extraction of metals from their ores. - Write ionic equations for displacement reactions, identifying what has been oxidised and what has been reduced. - Neutralisation reactions to produce soluble salts and water - pH scale and neutralisation. Recall difference between a weak and strong acid. - Electrolysis in molten and aqueous solutions - Using half-equation to represent the reactions at the electrodes. - Electrolysis of aluminium from aluminium oxide dissolved in molten Cryolite. **Skills:** - Using ratios to balance equations and calculate reacting masses - **RP8:** Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat	- Describe the main energy sources available on earth and the environmental impacts - Renewable energy alternatives to current fossil fuels used. **Skills** - **RP14:** an investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. - Confidently rearrange equations - Evaluate use of different energy sources.	- The use of hormones to treat infertility - Feedback systems **Skills** - Extract and interpret data from graphs, charts and tables - **RP6**: Plan and carry out an investigation into the effect of a factor on human reaction time - Evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues. - Interpret and explain simple diagrams of negative feedback control - - Evaluate from the perspective of patients and doctors the methods of treating infertility	<u>Chemistry of the atmosphere</u> - Describe how the Earth's early atmosphere formed - The composition of the Earth's current atmosphere - Describe and explain how oxygen increased and carbon dioxide decreased - Greenhouse gases and the greenhouse effect - How human activities contribute to the greenhouse effect - Carbon footprint and lifecycle assessments - Atmospheric pollutants <u>Using resources</u> - Potable water from fresh water and waste water - Bioleaching and phytoextraction from low grade ore - Reduce, reuse, recycle **Skills** - Opportunity to develop practical skills through: Investigating the properties of different hydrocarbons. - Use data to evaluate the use of various fractions produced from factional distillation. - **RP12:** Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. -**RP13:** Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. - Evaluate products through lifecycle assessments - Translate information between graphical and numeric form.	- Calculating power = potential difference x current. Power= (current)^2 x resistance - Energy transferred = power x time. Energy transferred = charge flow x potential difference - The national grid **Skills** - **RP15:** use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: • the length of a wire at constant temperature • Combinations of resistors in series and parallel. - **RP16:** use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. - Rearrange and apply equations.

		dilute acid and a water bath or electric heater to evaporate the solution. - **RP9:** Investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis.				
How is understanding assessed at the end of the unit?	End of topic test	End of topic test	End of topic test	End of topic test	End of topic test	End of topic test