SUBJECT: Science

YEAR GROUP:	Year 11 – 2021-2022					
RATIONALE:	Students will continue to build on the content studied in key stage three. Pupils will further develop their knowledge and understanding of Biology, Chemistry and Physics. Students will continue to develop scientific skills, directly linked to the required practicals including forming hypotheses, writing methods, using scientific equipment effectively as well as presenting and analysing results. Pupils will also develop and embed their understanding of the key scientific terms related to working scientifically. Pupils will also use a variety of resources to undertake guided study to help them prepare for their GCSE examinations. Pupils work through the units in rotation during the course of the year.					
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
	Topic/Unit: **Biology**: Bioenergetics **Chemistry**: Chemical Changes Electrolysis & Energy changes **Physics**: Particle Model of Matter	Topic/Unit: **Biology**: Ecology **Chemistry**: The Rate & Extent of Chemical Change **Physics**: Atomic Structure	Topic/Unit: **Biology**: Homeostasis and Response **Chemistry**: Organic Chemistry **Physics**: Forces	Topic/Unit: **Chemistry**: Chemical Analysis **Chemistry**: Chemistry of the Atmosphere **Physics**: Waves ***Physics***: *Space Physics (Physics Only)*	Topic/Unit: **Biology**: Inheritance, Variation & Evolution **Chemistry**: Using Resources **Physics**: Magnetism & Electromagnetism	Topic/Unit: **Revision of Biology, Chemistry and Physics**
Knowledge	**Biology** • Plant Tissues, Organs and Organ Systems Transport in Plants • Photosynthesis • Aerobic Respiration • Anaerobic Respiration • Metabolism **Chemistry** • Reactivity of Metals • Oxidation and Reduction • Extraction of Metals • Metal and Acid Reactions • Acids, Alkalis and pH Scale • Neutralisation • Making Soluble Salts • Electrolysis • Endothermic and Exothermic Reactions • Reaction Profile Diagrams • Bond Energies • *Chemical Cells and Batteries (Chemistry Only)* • *Fuel Cells (Chemistry Only)* **Physics**	**Biology** • Ecosystems and Feeding Relationships • Biotic and Abiotic Factors • Plant and Animal Adaptations • Using Quadrats and Transects • Water and Carbon Cycle • Biodiversity and Waste Management • Deforestation • Peat Bogs • Global Warming • *Decomposition (Biology Only)* • *Impact of Environmental Change (Biology Only)* • *Trophic Levels and Pyramids of Biomass (Biology Only)* • *Food Production (Biology Only)* **Chemistry** • Rate of Reaction • Calculating Rate of Reaction • Increasing Rate of Reaction • Reversible Reactions	**Biology** • Homeostasis • Human Nervous System • Human Endocrine System • Control of Blood Glucose Concentration in the Body • Hormones in Human Reproduction • Negative Feedback • *The Brain (Biology Only)* • *The Eye (Biology Only)* • *Control of Body Temperature (Biology Only)* • *Control of Water Concentration in the Body (Biology Only)* • *Plant Hormones (Biology Only)* **Chemistry** • Hydrocarbons • Crude Oil and Fractional Distillation • Complete and Incomplete Combustion • Cracking Hydrocarbons • Alkenes, Polymers and Bonding Model Limitations	**Chemistry** • Common Gas Tests • Purity and Formulations • Chromatography • *Testing for Positive Ions – Flame Tests (Chemistry Only)* • *Testing for Positive Ions – Using Sodium Hydroxide (Chemistry Only)* • *Testing for Negative Ions (Chemistry Only)* • *Flame Emission Spectroscopy (Chemistry Only)* **Chemistry** • Earth's Atmosphere • Greenhouse Gases • Atmospheric Pollutants **Physics** • Transverse and Longitudinal Waves. • Wave Properties. • Refraction of Waves. • Electromagnetic Waves.	**Biology** • Sexual and Asexual Reproduction • Meiosis • DNA and the Genome • Inheritance of Characteristics • Genetic Disorders • Selective Breeding • Variation and Evolution • Fossils and Evidence for Evolution • Extinction • Genetic Engineering • Resistant Bacteria • Classification • *Advantages and Disadvantages of Sexual and Asexual Reproduction (Biology Only)* • *DNA Structure (Biology Only)* • *Plant and Animal Cloning (Biology Only)* • *Developing the Theory of Evolution (Biology Only)* • *Speciation (Biology Only)* • *Understanding of Genetics (Biology Only)* **Chemistry**	Pupils will undertake guided revision using a variety of resources to support them. This will involve: - Revisiting content from Biology, Chemistry and Physics units - Use of retrieval quizzes to review content studied. - Regular completion of past papers either individually, in pairs or through teacher modelling - Revision skills and exam technique will be revisited and embedded.

	• Changes of State and the Particle Model. • Density. • Internal Energy. • Specific Heat Capacity and Specific Latent Heat. • Particle Model and Pressure. • *Pressure in Gases (Physics only).*	• Dynamic Equilibrium **Physics** • Atoms and Isotopes. • Nuclear Radiation. • *Hazards and Uses of Radiation (Physics only).* • *Background Radiation (Physics only).* • *Nuclear Fission and Fusion (Physics only).*	• *Reactions of Alkenes (Chemistry Only)* • *Alcohols (Chemistry Only)* • *Carboxylic Acids & Esters (Chemistry Only)* • *Addition Polymerisation (Chemistry Only)* • *Condensation Polymerisation (Chemistry Only)* • *Naturally Occurring Polymers (Chemistry Only)* **Physics** • Forces and their Interactions. • Work Done and Mechanical Energy Transfer. • Forces and Elasticity. • Speed, Velocity and Acceleration. • Forces and Motion. • Momentum. • *Changes in Momentum (Physics Only).* • *Moments, Levers and Gears (Physics Only).* *Pressure and Pressure Differences in Fluids (Physics Only).*	• Uses of Electromagnetic Waves. • *Reflection of Waves (physics Only).* • *Sound Waves (Physics Only).* • *Waves for Detection and Exploration (Physics Only).* • *Lenses (Physics Only).* • *Visible Light (Physics Only).* • *Black Body Radiation (Physics Only)* ***Physics*** • *The Solar System (Physics Only).* • *Stability of Orbital Motions and Satellites (Physics Only).* • *The Life Cycle of A Star (Physics Only).* • *Red-Shift (Physics Only).*	• Using the Earth's Resources and Sustainable Development • Potable Water • Water Purification • Waste Water Treatment • Life Cycle Assessments and Reducing the use of Resources • Alternative Methods of Extracting Metals • *Corrosion and its Prevention (Chemistry Only)* • *Alloys as Useful Materials (Chemistry Only)* • *Ceramics, Polymers and Composites (Chemistry Only)* • *Haber Process (Chemistry Only)* • *NPK Fertilisers (Chemistry Only)* **Physics** • Permanent and Induced Magnetism. • Magnetic Forces and Fields. • Electromagnetism. • The Motor Effect. • *Induced Potential Difference and the Generator Effect (Physics Only).* *Transformers (Physics Only).*	

Skills	**Biology:** Photosynthesis: - Pupils will investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. **Chemistry:** Making Salts - Pupils will prepare a pure, dry sample of a soluble salt from an insoluble oxide or carbonate using a Bunsen burner to heat dilute acid and a water bath to evaporate the solution. *Neutralisation (Chemistry Only)* *- Pupils will determine the reacting volumes of solutions of a*	**Biology:** Field Investigations: - Pupils will measure the population size of a common species in a habitat, using sampling techniques to investigate the effect of a factor on the distribution of this species. *Decay (Biology Only)* *- Pupils will investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.* **Chemistry:** Rates of reaction - Pupils will investigate how changes in concentration affect the rates of reactions by	**Biology:** Reaction Time - Pupils will plan and carry out an investigation into the effect of a factor on human reaction time. *Plant Responses (Biology Only)* *- Pupils will investigate the effect of light or gravity on the growth of newly germinated seedlings.* **Physics:** Force and Extension - Pupils will investigate the relationship between force and extension of a spring. Acceleration - Pupils will investigate the effect of varying the force on the acceleration of an object of	**Chemistry:** Chromatography - Pupils will investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students will calculate Rf values. *Identifying ions (Chemistry Only)* *- Pupils will use chemical tests to identify the ions in unknown single ionic compounds covering the ions from flame tests and sulphates.* **Physics:** Waves - Pupils will make observations to	**Chemistry:** Water Purification - Pupils will analyse and purify water samples from different sources. This will include pH measurement, removal of dissolved solids and distillation.	Alongside revision of key content, the working scientifically skills will be revisited and embedded Pupils will also develop their exam technique and revisit and embed their understanding of the command words used in GCSE science examinations.
Assessments	**Biology**: Bioenergetics Exam Style Questions Assessment **Chemistry**: Chemical Changes and Electrolysis & Energy Changes Exam Style Questions Assessment **Physics**: Particle Model of Matter Exam Style Questions Assessment	**Biology**: Ecology Exam Style Questions Assessment **Chemistry**: The Rate & Extent of Chemical Change Exam Style Questions Assessment **Physics**: Atomic Structure Exam Style Questions Assessment **Mock Exams:** Pupils will complete three exam papers, one in biology, one in chemistry and	**Biology**: Homeostasis & Response Exam Style Questions Assessment **Chemistry**: Organic Chemistry Exam Style Questions Assessment **Physics**: Forces Exam Style Questions Assessment	**Chemistry**: Chemical Analysis & Chemistry of the Atmosphere Exam Style Questions Assessment **Physics**: Waves Exam Style Questions Assessment *Space Physics Exam Style Questions Assessment (Physics Only)* **Trial Exams:** Pupils will complete three exam papers, one in	**Biology**: Inheritance, Variation & Evolution Exam Style Questions Assessment **Chemistry**: Using Resources Exam Style Questions Assessment ***Physics***: Magnetism & Electromagnetism Exam Style Questions Assessment	

Homework	All pupils will be set a number of 20 question educake quizzes to complete online using the www.educake.co.uk website related to the content they are studying. Pupils may be set independent practice questions to complete in their science booklets for these units. They can use the content and guided practice sections of the booklet to support them to complete the work. Pupils are also expected to regularly test themselves on the retrieval quizzes in their booklets, to support them to learn the key content of the units. Revision for end of unit assessments and mock exams.	All pupils will be set a number of 20 question educake quizzes to complete online using the www.educake.co.uk website related to the content they are studying. Pupils may be set independent practice questions to complete in their science booklets for these units. They can use the content and guided practice sections of the booklet to support them to complete the work. Pupils are also expected to regularly test themselves on the retrieval quizzes in their booklets, to support them to learn the key content of the units. Revision for end of unit assessments and mock exams.	All pupils will be set a number of 20 question educake quizzes to complete online using the www.educake.co.uk website related to the content they are studying. Pupils may be set independent practice questions to complete in their science booklets for these units. They can use the content and guided practice sections of the booklet to support them to complete the work. Pupils are also expected to regularly test themselves on the retrieval quizzes in their booklets, to support them to learn the key content of the units. Revision for end of unit assessments and trial exams.	All pupils will be set a number of 20 question educake quizzes to complete online using the www.educake.co.uk website related to the content they are studying. Pupils may be set independent practice questions to complete in their science booklets for these units. They can use the content and guided practice sections of the booklet to support them to complete the work. Pupils are also expected to regularly test themselves on the retrieval quizzes in their booklets, to support them to learn the key content of the units. Revision for end of unit assessments and trial exams.	All pupils will be set a number of 20 question educake quizzes to complete online using the www.educake.co.uk website related to the content they are studying. Pupils may be set independent practice questions to complete in their science booklets for these units. They can use the content and guided practice sections of the booklet to support them to complete the work. Pupils are also expected to regularly test themselves on the retrieval quizzes in their booklets, to support them to learn the key content of the units. Revision for end of unit assessments and GCSE exams.	Revision and completion of past paper practice exam papers.

All pupils have their own username and password for the www.educake.co.uk website where they can complete the online quizzes set for homework. If pupils are struggling to access the website, they Should speak to one of their science teachers. Pupils can also set themselves quizzes on specific topics on the Educake website to support them with their revision.