SUBJECT: Science

YEAR GROUP	Year Eleven					
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: Homeostasis** **Chemistry: Organic Chemistry** **Physics: Waves**	**Chemistry: Chemical Analysis** **Chemistry: Earth's Atmosphere** **Physics: Magnetism & Electromagnetism**	**Biology: Inheritance, Variation and Evolution** **Chemistry: Using Resources** **Physics: Space (Physics Only)**		**Revision of Biology, Chemistry and Physics**	
Knowledge	Biology – Homeostasis 1 – What is homeostasis? 2 – What happens in the nervous system? 3 – How can we measure our reaction time? 4 – How do we control our blood glucose levels? 5 - How are hormones involved in puberty and the menstrual cycle? 6 – How does contraception prevent pregnancy? 7 – How can hormones be used to help couples become pregnant? 8 - What happens in negative feedback? 9 - What is the job of the brain? (BIOLOGY ONLY) 10 - What happens to the eye in bright and dim light? (BIOLOGY ONLY) 11 - How do we see near and distant objects? (BIOLOGY ONLY) 12 - How do we control our body temperature? (BIOLOGY ONLY) 13 - How do your kidneys work? (BIOLOGY ONLY) 14 - How can kidney problems be treated? (BIOLOGY ONLY) 15 - What are the effects of plant hormones? (BIOLOGY ONLY) 16 - How can light and gravity affect seedlings? (BIOLOGY ONLY) Chemistry – Organic Chemistry 1 – What are alkanes and where do they come from? 2 – How does fractional distillation work? 3 – What is cracking and how does it work? 4 – What are alkenes and how do they react? (CHEMISTRY ONLY) 5 - What are alcohols and how do they react? (CHEMISTRY ONLY) 6 – What are carboxylic acids and how do they react? (CHEMISTRY ONLY) 7 – What is addition polymerisation? (CHEMISTRY ONLY) 8 - What is condensation polymerisation? (CHEMISTRY ONLY)	Chemistry – Chemical Analysis 1 – What are pure and impure substances? 2 – How does chromatography work? 3 – How do you test for negative ions? (CHEMISTRY ONLY) 4 – How do you identify positive ions, using flame tests? (CHEMISTRY ONLY) 5 - How do you identify positive ions, using sodium hydroxide? (CHEMISTRY ONLY) 6 – How do you test for positive ions, using flame emission spectroscopy? (CHEMISTRY ONLY) Chemistry – Earth's Atmosphere 1 – How and why has the Earth's atmosphere changed? 2 – How were fossil fuels formed? 3 – What is the greenhouse effect? 4 – What are the atmospheric pollutants from fuels? Physics – Magnetism 1 – What are magnetic fields? 2 – What is the difference between permanent and induced magnetism? 3 – How do electromagnets work? 4 – What is Fleming's left hand rule? 5 - How do you use the motor effect equation? 6 – How do you make a simple electric motor? 7 – What is the Generator Effect? (PHYSICS ONLY) 8 - How do alternators and dynamos work? (PHYSICS ONLY) 9 - How do loudspeakers and microphones work? (PHYSICS ONLY) 10 - How do transformers change potential difference? (PHYSICS ONLY) 11 - How do you use the transformer equations to calculate current and power ? (PHYSICS ONLY)	Biology – Inheritance, Variation and Evolution 1 – What is the difference between sexual and asexual reproduction? 2 – What is your genome? 3 – How are features inherited? 4 – How are inherited diseases passed on? 5 - What is selective breeding? 6 – What is evolution? 7 – What is the evidence for evolution? 8 - How do bacteria become resistant? 9 - How and why do we genetically engineer organisms? 10 - How have classification systems changed over time? 11 - What are the advantages and disadvantages of sexual and asexual reproduction? (BIOLOGY ONLY) 12 - What is the structure of DNA and how does DNA code for proteins? (BIOLOGY ONLY) 13 - How are plants cloned? (BIOLOGY ONLY) 14 - How are animals cloned? (BIOLOGY ONLY) 15 - How was the theory of evolution developed? (BIOLOGY ONLY) 16 - How do new species develop? (BIOLOGY ONLY) 17 - How has our understanding of genetics developed over time? (BIOLOGY ONLY) Chemistry – Using Resources 1 – How do we obtain potable water? 2 – How do we purify water? 3 – How do we treat waste water? 4 – What are Life Cycle Assessments? 5 - How can we reduce the use of earth's resources? 6 – How can we extract metals from low grade ores? 7 – What is corrosion and how can we prevent it? (CHEMISTRY ONLY)	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. - use of knowledge organisers and retrieval mats 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.	

	9 - What are naturally occurring polymers? (CHEMISTRY ONLY) Physics – Waves 1 – What is the difference between transverse and longitudinal waves? 2 – How do you measure the speed of waves in water and a solid? 3 – What is the electromagnetic spectrum? 4 – What are the effects of infrared radiation? 5 - What are the properties of visible light? 6 – How can refraction be measured? (PHYSICS ONLY) 7 – How do lenses work? (PHYSICS ONLY) 8 - How do we see colour? (PHYSICS ONLY) 9 - What is black body radiation? (PHYSICS ONLY) 10 - What is ultrasound and how is it used? (PHYSICS ONLY) 11 - What are seismic waves? (PHYSICS ONLY)		8 - What are alloys and why are they useful? (CHEMISTRY ONLY) 9 - What are ceramics, polymers and composites? (CHEMISTRY ONLY) 10 - What is the Haber process? (CHEMISTRY ONLY) 11 - What are NPK fertilisers? (CHEMISTRY ONLY) Physics – Space 1 – What are the main components of our solar system? (PHYSICS ONLY) 2 – How are stars 'born' and how do they 'die'? (PHYSICS ONLY) 3 – How did the universe begin? (PHYSICS ONLY)	

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Skills	**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:** **Waves** **- Pupils will make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves.** ***Light (Physics Only)*** ***- Pupils will investigate the reflection of light by different types of surface and the refraction of light by different substances.*** **Radiation and Absorption** **- Pupils will investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.**	**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.***	**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.**	

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Assessments: Formative	Formative assessment will regularly take place during science lessons.					
Assessments: Summative			Assessment Window – Trial Exams Biology Assessment Biology Unit 4 - Bioenergetics Biology Unit 5 – Homeostasis and Response Biology Unit 7 – Ecology Chemistry Assessment Chemistry Unit 3 - Quantitative Chemistry Chemistry Unit 6 – Rate & Extent of Chemical Change Chemistry Unit 7 – Organic Chemistry Chemistry Unit 8 - Chemical Analysis Physics Assessment Physics Unit 1 - Energy Physics Unit 5 – Forces		GCSE Paper 1 Biology Assessment Biology Unit 1 – Cell Biology Biology Unit 2 - Organisation Biology Unit 3 – Infection & Response Biology Unit 4 - Bioenergetics Chemistry Assessment Chemistry Unit 1 – Atomic Structure & the Periodic Table Chemistry Unit 2 – Structure & Bonding Chemistry Unit 3 - Quantitative Chemistry Chemistry Unit 4 – Chemical Changes Chemistry Unit 5 – Energy Changes Physics Assessment Physics Unit 1 – Energy Physics Unit 2 - Electricity Physics Unit 3 – Particle Model of Matter Physics Unit 4 - Atomic Structure	GCSE Paper 2 Biology Assessment Biology Unit 5 – Homeostasis and Response Biology Unit 6 – Inheritance, Variation & Evolution Biology Unit 7 – Ecology Chemistry Assessment Chemistry Unit 6 – Rate & Extent of Chemical Change Chemistry Unit 7 – Organic Chemistry Chemistry Unit 8 - Chemical Analysis Chemistry Unit 9 – Chemistry of the Atmosphere Chemistry Unit 10 – Using Resources Physics Assessment Physics Unit 5 – Forces Physics Unit 6 – Waves Physics Unit 7 – Magnetism & Electromagnetism Physics Unit 8 (Triple Only) - Space Physics
Homework	Pupils in year eleven will be set one piece of Sparx Science homework each week. To help support pupils to develop a good routine in relation to home learning this science homework will always be set on a Friday and due in the following Thursday. Pupils are expected to spend approximately 90 minutes on each piece of Sparx Science homework.					