

Subject: Science

Year group: Year 11

Department Curriculum Vision:

The KS4 Science Curriculum is designed to provide students with a comprehensive understanding of key scientific concepts and principles, develop their scientific skills and knowledge, and develop a mindset necessary for further study or careers in science-related fields. As well as an appreciation of science in developing the world around them.

	Autumn Term 1	Autumn Term 2
Content: (Know what...)	<u>Waves</u> - Transverse and longitudinal waves - Properties of waves - Reflection of waves (physics only) - Sound waves (physics only) - Waves for detection and exploration (physics only) - Types of electromagnetic waves - Properties of electromagnetic waves 1 - Properties of electromagnetic waves 2 - Uses and applications of electromagnetic waves - Lenses (physics only) - Visible light (physics only) - Emission and absorption of infrared radiation (Physics Only) - Perfect black bodies and radiation <u>Organic Chemistry</u> - Crude oil, hydrocarbons and alkanes - Fractional distillation and petrochemicals - Properties of hydrocarbons - Cracking and alkenes - Structure and formulae of alkenes (Chemistry Only) - Reactions of alkenes (Chemistry Only) - Alcohols (Chemistry Only) - Carboxylic acids (Chemistry Only) - Addition polymerisation (Chemistry Only) - Condensation polymerisation (Chemistry Only)	<u>Homeostasis and Response</u> - Homeostasis - Structure and function of the human nervous system - The brain (biology only) - The eye (biology only) - Control of body temperature (biology only) - Human endocrine system - Control of blood glucose concentration - Maintaining water and nitrogen balance in the body (biology only) - Hormones in human reproduction - Contraception - The use of hormones to treat infertility (HT only) - Negative feedback (HT only) - Plant hormones - Control and coordination (Biology Only) - Use of plant hormones (Biology Only) <u>Chemistry of the Atmosphere</u> - The proportions of different gases in the atmosphere - The Earth's early atmosphere - How oxygen increased - How carbon dioxide decreased - Greenhouse gases - Human activities which contribute to an increase in greenhouse gases in the atmosphere - Global climate change - The carbon footprint and its reduction

- Amino acids (Chemistry Only)
- DNA (deoxyribonucleic acid) and other naturally occurring polymers (Chemistry Only)

The Rate and Extent of Chemical Change

- Calculating rates of reactions
- Factors which affect the rates of chemical reactions
- Collision theory and activation energy
- Catalysts
- Reversible reactions
- Energy changes and reversible reactions
- Equilibrium
- The effect of changing conditions on equilibrium (HT only)
- The effect of changing concentration (HT only)
- The effect of temperature changes on equilibrium (HT only)
- The effect of pressure changes on equilibrium (HT only)

Space (Physics Only)

- Our solar system
- The life cycle of a star
- Orbital motion, natural and artificial satellites
- Red-shift

- Atmospheric pollutants from fuels
- Properties and effects of atmospheric pollutants

Using Resources

- Using the Earth's resources and sustainable development
- Potable water
- Waste water treatment
- Alternative methods of extracting metals (HT only)
- Life cycle assessment
- Ways of reducing the use of resources
- Corrosion and its prevention (Chemistry Only)
- Alloys as useful materials (Chemistry Only)
- Ceramics, polymers and composites (Chemistry Only)
- The Haber process (Chemistry Only)
- Production and uses of NPK fertilisers (Chemistry Only)

Magnetism and Electromagnetism

- Poles of a magnet
- Magnetic fields
- Electromagnetism
- Fleming's left-hand rule (HT only)
- Electric motors (HT only)
- Loudspeakers (physics only) (HT only)
- Induced potential (HT only)
- Uses of the generator effect (HT only)
- Microphones (HT only)
- Transformers (HT only)

Skills: (know how...)	<u>Waves Practical Skills</u> - Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. - Investigate the reflection of light by different types of surface and the refraction of light by different substances. (Physics Only) - Investigate the reflection of light by different types of surface and the refraction of light by different substances (Physics Only) - Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface <u>The Rate and Extent of Chemical Change - Practical Skills</u> - Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity.	<u>Homeostasis and Response - Practical Skills</u> - Plan and carry out an investigation into the effect of a factor on human reaction time. - Investigate the effect of light or gravity on the growth of newly germinated seedlings. (Biology Only)
Key vocabulary	<u>Waves</u> - Transverse wave - Longitudinal wave - Frequency - Wavelength - Amplitude - Period - Refraction - Oscillations <u>Organic chemistry</u> - Crude oil - Hydrocarbons	<u>Homeostasis and response</u> - Reflex arc - Reaction time - Glands - Endocrine system - Diabetes - Menstrual cycle <u>Chemistry of the atmosphere</u> - Photosynthesis - Respiration - Greenhouse effect - Greenhouse gases

	- Alkenes - Alkanes - Fractional distillation - Viscosity <u>Rate of reaction</u> - Collision theory - Catalyst - Reversible reactions - Equilibrium - Closed system - Le'Chateliers principle	- Climate change - Carbon footprint - Pollution - Acid rain <u>Using resources</u> - Finite resources - Fossil fuels - Renewable resources - Potable water - Filtration - Sterilisation - Life cycle assessment <u>Magnetism and electromagnetism</u> - Poles - Attract - Repel - Permanent /induced magnets - Motor effect - Electromagnets - Solenoids
Mid Term Assessment	MUAs will be present in all topics. Some larger topics that stretch more than 3 weeks may have 2 MUAs to give students the best chance at understanding content before an EUA.	MUAs will be present in all topics. Some larger topics that stretch more than 3 weeks may have 2 MUAs to give students the best chance at understanding content before an EUA.
End Term Assessment	All topics will be followed by an EUA.	All topics will be followed by an EUA.
	Spring 1	Spring 2

Content: (Know what...)	<u>Inheritance, Variation and Evolution</u> - Sexual and asexual reproduction - Meiosis - Advantages and disadvantages of sexual and asexual reproduction (Biology Only) - DNA and the genome - DNA structure (Biology Only) - Genetic inheritance - Inherited disorders - Sex determination - Variation - Evolution - Selective breeding - Genetic engineering - Cloning (biology only) - Theory of evolution (Biology Only) - Speciation (Biology Only) - The understanding of genetics (Biology Only) - Evidence for evolution - Fossils - Extinction - Resistant bacteria - Classification of living organisms <u>Ecology</u> - Communities - Abiotic factors - Biotic factors - Adaptations - Levels of organisation - How materials are cycled - Decomposition (Biology Only) - Impact of environmental change (biology only) (HT only) - Biodiversity - Waste management	Revision
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	- Land use - Deforestation - Global warming - Maintaining biodiversity - Trophic levels (Biology Only) - Pyramids of biomass (Biology Only) - Transfer of biomass (Biology Only) - Factors affecting food security (Biology Only) - Farming techniques (Biology Only) - Sustainable fisheries (Biology Only) - Role of biotechnology (Biology Only)	
Skills: (Know how...)	Ecology - Practical Skills - Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. - Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. (Biology Only)	

Key vocabulary	<u>Inheritance and variation</u> - Reproduction - Fertilisation - Meiosis & Mitosis - Punnet squares - Genotype - Phenotype - Homozygous - Heterozygous - Variation - Selective breeding - Classification - Evolution - Extinction <u>Ecology</u> - Ecosystem - Abiotic factors - Biotic factors - Adaptatio - Competition - Food chains - Quadrats - Biodiversity - Deforestation - Pesticides - Water cycle - Carbon cycle - Global warming - Greenhouse gases	
Mid Term Assessment	MUAs will be present in all topics. Some larger topics that stretch more than 3 weeks may have 2 MUAs to give students the best chance at understanding content before an EUA.	MUAs will be present in all topics. Some larger topics that stretch more than 3 weeks may have 2 MUAs to give students the best chance at understanding content before an EUA.

End Term Assessment	All topics will be followed by an EUA.	
	Summer 1	Summer 2
Content: (Know what...)	Exams	Exams
Skills: (Know how...)		
Key vocabulary		
Mid Term Assessment		
End Term Assessment		
Additional information		
Homework	Follow the school policy of 1 hour per week per class. This will be double for triple science students. The homework set is down to the teacher as they will set homework that is suitable, achievable and beneficial to the class.	

Extra curricular and enrichment opportunities	• Science Club • Science week • Science Careers
Useful links that will support learning	Seneca - https://senecalearning.com/en-GB/ BBC Bitesize - https://www.bbc.co.uk/bitesize/subjects/zng4d2p Sparx science - https://sparxscience.com/
How parents can support learning	We encourage parents/carers to engage in conversation with their child/children about their science lessons and homework. We also encourage parents to