Curriculum Area: GCSE Combined Science (Trilogy) Physics and GCSE Physics

Knutsford Academy Curriculum Map

	Autumn1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	**Models / Electric circuits**	**Motion and forces**	**Energy resources / Domestic electricity / Electric circuit applications**	**Waves in air, fluids, and solids**	**Particle model of matter / Radioactivity**	**Motion and forces II**
	Energy model Substantive knowledge headlines: • Energy stores and transfers Disciplinary knowledge headlines: • Using a variety of concepts and models to develop scientific explanations and understanding Link to knowledge from previous units: • KS3 Energy Link to knowledge in future units: • GCSE Energy resources, Particles, Energy calculations **Atomic structure (development of the model)** Substantive knowledge headlines: • The nuclear model and its development in the light of changing evidence • Sizes of nuclei and atoms Disciplinary knowledge headlines: • The ways in which scientific methods and theories develop over time Math skills: • Using prefixes and powers of ten for orders of magnitude Link to knowledge from previous units: • KS3 Particle model of matter and Atomic structure (Chemistry) Link to knowledge in future units: • GCSE Radioactivity, Nuclear equations, Atomic structure (Chemistry) **Electric circuits** Substantive knowledge headlines: • measuring resistance using p.d. and current measurements • quantity of charge flowing as the product of current and time • drawing circuit diagrams; exploring equivalent resistance for resistors in series Disciplinary knowledge headlines: • using an appropriate number of significant figures in calculations Math skills: • Solve simple algebraic equations Link to knowledge from previous units: • KS3 Electric circuits Link to knowledge in future units: • GCSE Domestic electricity, Electricity applications, Magnetism & electromagnetism	**Motion and forces** Substantive knowledge headlines: • speed of sound, estimating speeds in everyday contexts • interpreting quantitatively graphs of distance, time, and speed • acceleration caused by forces; Newton's First Law • weight and gravitational field strength • forces and fields: gravity • forces as vectors Disciplinary knowledge headlines: • using a variety of concepts and models to develop scientific explanations and understanding • applying a knowledge of a range of techniques, apparatus, and materials to select those appropriate both for experiments • communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions • recognising the importance of scientific quantities and understanding how they are determined Math skills: • Recognise and use expressions in decimal form • Make estimates of the results of simple calculations • Find arithmetic means • Change the subject of an equation • Substitute numerical values into algebraic equations using appropriate units for physical quantities • Solve simple algebraic equations • Translate information between graphical and numeric form • Understand and use the symbols: =, ∝, ~ Link to knowledge from previous units: • KS3 Motion and forces Link to knowledge in future units: • GCSE Motion and forces II • GCSE Resultant forces • GCSE Forces and driving	**Energy resources** Substantive knowledge headlines: • power and efficiency • renewable and non-renewable energy sources, including fission and fusion Disciplinary knowledge headlines: • appreciating the power and limitations of science Math skills: • Construct and interpret frequency tables and diagrams, bar charts and histograms Link to knowledge from previous units: • KS3 Energy • GCSE Energy model Link to knowledge in future units: • GCSE Radioactivity, Energy calculations, Magnetism & EM • A-Level Physics – Mechanics, Nuclear physics, Astrophysics **Domestic electricity** Substantive knowledge headlines: • the domestic AC supply; wires & safety • power transfer Disciplinary knowledge headlines: • explaining every day and technological applications of science Math skills: • Solve simple algebraic equations Link to knowledge from previous units: • KS3/GCSE Electric circuits Link to knowledge in future units: • GCSE Electricity applications, Static electricity (Triple only), Magnetism & EM • A-Level Physics – Electricity, Fields **Electric circuit applications** Substantive knowledge headlines: • measuring resistance using p.d. and current measurements • exploring current, resistance and voltage relationships for different circuit elements Disciplinary knowledge headlines: • carrying out experiments appropriately • recognising when to apply a knowledge of sampling techniques Math skills: • Plot two variables from experimental or other data Link to knowledge from previous units: • KS3/GCSE Electric circuits Link to knowledge in future units: • GCSE Magnetism & electromagnetism • A-Level Physics – Electricity, Particles and quantum phenomena, Fields	**Waves in air, fluids, and solids** Substantive knowledge headlines: • wave motion - transverse and longitudinal waves • describing waves in terms of amplitude, wavelength, and frequency • relating wave speed to frequency and wavelength • wave speeds differing between media: reflection and refraction effects (triple science only) Disciplinary knowledge headlines: • apply knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to an experiment. • recognising when to apply a knowledge of sampling techniques to ensure any samples collected are representative • make and record observations and measurements using a range of apparatus and methods. • applying the cycle of collecting, presenting and analysing data • communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions • use SI units Math skills: • change the subject of an equation • substitute numerical values into algebraic equations using appropriate units for physical quantities • Use angular measures in degrees • Use ratios, fractions, and percentages Link to knowledge from previous units: • KS3 Waves • GCSE Energy model Link to knowledge in future units: • GCSE Electromagnetic waves • A-Level Physics – Waves; Further mechanics, Astrophysics	**Particle model of matter** Substantive knowledge headlines: • relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities • melting, evaporation, and sublimation as reversible changes • calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat Disciplinary knowledge headlines: • carrying out experiments appropriately Math skills: • Draw and use the slope of a tangent to a curve as a measure of rate of change Link to knowledge from previous units: • KS3 Particle model of matter (Chemistry) • GCSE Energy model Link to knowledge in future units: • GCSE Pressure, Energy calculations, Electromagnetic waves • A-Level Physics – Mechanics, Thermal physics **Radioactivity** Substantive knowledge headlines: • radioactive nuclei: emission related to changes in the nuclear mass and/or charge • radioactive materials, half-life, irradiation, contamination and their associated hazardous effects, waste disposal Disciplinary knowledge headlines: • evaluating risks both in practical science and the wider societal context, including perception of risk • the importance of peer review Math skills: • Use ratios, fractions, and percentages • Translate information between graphical and numeric form • Plot two variables from experimental or other data Link to knowledge from previous units: • KS3 Atomic structure (Chemistry), Waves • GCSE Models, Energy resources Link to knowledge in future units: • GCSE Electromagnetic waves, Nuclear equations • A-Level Physics – Particles and quantum phenomena, Nuclear physics, Astrophysics	**Motion and forces** Substantive knowledge headlines: • estimating speeds and accelerations in everyday contexts • interpreting quantitatively graphs of distance, time, and speed • acceleration caused by forces; Newton's First Law Disciplinary knowledge headlines: • making and recording observations and measurements using a range of apparatus and methods • evaluating methods and suggesting possible improvements and further investigations • applying the cycle of collecting, presenting and analysing data • communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions Math skills: • Make estimates of the results of simple calculations • Find arithmetic means • Change the subject of an equation • Substitute numerical values into algebraic equations using appropriate units for physical quantities • Solve simple algebraic equations • Draw and use the slope of a tangent to a curve as a measure of rate of change • Determine the slope and intercept of a linear graph • Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate • Translate information between graphical and numeric form • Plot two variables from experimental or other data • Understand and use the symbols: =, ∝, ~ Link to knowledge from previous units: • KS3 Motion and forces • GCSE Motion and forces I Link to knowledge in future units: • GCSE Resultant forces • GCSE Forces and driving • A-Level Physics – Mechanics, Further mechanics, Fields
Assessments	**Progress Point 1 Assessment**	**Progress Point 2 Assessment**	**Trial Exam (used for Progress Point 3)**		**Progress Point 4 Assessment**	

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Knutsford Academy Curriculum Map

	Autumn1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11	**Forces**	**Waves in air, fluids, and solids**	**Electromagnetic waves**	**Magnetism and electromagnetism / Space physics (Triple Science only)**	**Revision and examinations**	
	Forces Substantive knowledge headlines: • decelerations and braking distances involved on roads, safety • pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative) Disciplinary knowledge headlines: • evaluating risks both in practical science and the wider societal context, including perception of risk • the importance of peer review of results and of communication of results to a range of audiences Math skills: • Make estimates of the results of simple calculations • Draw and use the slope of a tangent to a curve as a measure of rate of change • Determine the slope and intercept of a linear graph • Translate information between graphical and numeric form • Understand and use the symbol ~ Link to knowledge from previous units: • KS3 Motion and forces • GCSE Motion and forces Link to knowledge in future units: • A-Level Physics – Mechanics, Further mechanics	**Waves in air, fluids, and solids** Substantive knowledge headlines: • wave motion - transverse and longitudinal waves • describing waves in terms of amplitude, wavelength, and frequency • relating wave speed to frequency and wavelength • wave speeds differing between media: reflection and refraction effects (triple science only) Disciplinary knowledge headlines: • apply knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to an experiment. • make and record observations and measurements using a range of apparatus and methods. • use SI units Math skills: • change the subject of an equation • substitute numerical values into algebraic equations using appropriate units for physical quantities • Use angular measures in degrees Link to knowledge from previous units: • KS3 Waves • GCSE Energy model Link to knowledge in future units: • GCSE Electromagnetic waves • A-Level Physics – Waves; Further mechanics	**Electromagnetic waves** Substantive knowledge headlines: • properties and uses in the radio, microwave, infrared, visible, ultraviolet, X-ray and gamma ray regions • velocity in a vacuum and velocities differing between media: absorption, reflection, refraction effects • production and detection, by electrical circuits, or by changes in atoms and nuclei • hazardous effects on bodily tissues. Disciplinary knowledge headlines: • describe and explain specified examples of the technological applications of science • give examples to show that there are hazards associated with science-based technologies which must be considered alongside the benefits. Math skills: • change the subject of an equation • substitute numerical values into algebraic equations using appropriate units for physical quantities • use angular measures in degrees • use SI units Link to knowledge from previous units: • KS3 Energy; Waves • GCSE Waves in air, fluids, and solids; Radioactivity Link to knowledge in future units: • A-Level Physics – Waves; Further mechanics	**Magnetism & electromagnetism** Substantive knowledge headlines: • forces and fields: magnetic • exploring the magnetic fields of permanent and induced magnets, and the Earth's magnetic field, using a compass • magnetic effects of currents, how solenoids enhance the effect • how transformers are used in the national grid and the reasons for their use Disciplinary knowledge headlines: • planning experiments to make observations, test hypotheses or explore phenomena Math skills: • Solve simple algebraic equations • Use ratios, fractions and percentages Link to knowledge from previous units: • KS3 Magnetism & electromagnetism • GCSE Electric circuits, Energy resources, Domestic electricity, Electricity applications Link to knowledge in future units: • A-Level Physics – Fields **Space physics** (Triple only) Substantive knowledge headlines: • the main features of the solar system. Disciplinary knowledge headlines: • the ways in which scientific methods and theories develop over time Math skills: • Translate information between graphical and numeric form Link to knowledge from previous units: • KS3 Motion and forces, Space physics (optional) • GCSE Forces, Energy, Waves Link to knowledge in future units: • A-Level Physics – Fields, Nuclear physics, Astrophysics		
Assessments	**Progress Point 1 Assessment**	**Trial Exam 1 (used for Progress Point 2)**	**Trial Exam 2 (used for Progress Point 3)**			