ASSOCIATED SIXTH FORM
ST AIDAN'S & ST JOHN FISHER, HARROGATE

Course Outline: **A-Level Physics** **Year 12**

Rationale: The AQA Physics course builds on the knowledge from GCSE, developing a more mathematical approach to the subject as a bridge to studying the subject at university. There is a big emphasis on problem solving skills in exams. The course embeds practical work into the delivery of the content and you are assessed on your practical work through exam questions as well as in class; specifically following methods, using equipment, working safely, recording observations and reporting findings.

Year 12 begins with new content in the form of Particle Physics alongside familiar Electricity content which provides a good opportunity to get started on experimental work. Waves, forces and materials make up the rest of the Y12 content; in the final half-term in the summer we cover practical work and begin content for Y13.

	CONTENT	KEY/FUNDAMENTAL CONCEPTS	ASSESSMENT
Autumn Term	**Electric Current**	Fundamentals of the nature of electricity. Current, potential difference, Power, Resistance. Ohm's Law Superconductivity Component Characteristics	**1st: Matter and Radiation test** 1 hour, past paper questions Possible 2nd: Electric Current test **Required practical - Resistivity**
	Matter and Radiation	Atomic Structure Fundamental forces Photons Anti-matter, annihilation Feynman Diagrams	
	Half-term		
	DC Circuits	Rules for current and p.d. in series and parallel circuits. EMF and internal resistance Potential divider.	**1st: DC Circuits Test** 1 hour, past paper questions Possible 2nd: Quantum Phenomena test **Required practical – EMF and Internal Resistance**
	Quarks and Leptons	Properties and classification of particles. Conservation rules.	
	Quantum Phenomena	Photoelectric effect Excitation and de-excitation Spectra Fluorescence Wave-particle duality	
	Christmas Holiday		
Spring Term	**Forces in Equilibrium**	Forces in equilibrium Resolving forces Moments Statics	**January Assessment on content from Autumn Term 1 hour past paper questions on Particles and Electricity**
	Waves	Types of waves Wave properties Wave behaviour	**1st: Forces Module test** 1 hour, past paper questions

	Dynamics	Stationary and progressive waves Motion along a straight line Free fall Motion graphs Projectile motion	**Required practical – Stationary Waves** **Required Practical – free fall**
	Half-term		
	Optics	Refraction Total internal reflection Diffraction Interference Diffraction grating	**1st: Waves module test** 1 hour, past paper questions Possible 2nd: Newtons Laws **Required practical – Diffraction of light**
	Newtons Laws	Force and acceleration Resultant force Terminal speed Vehicle safety	
	Forces and Momentum	Momentum and impulse Conservation of momentum Elastic and inelastic collisions Explosions	
	Easter Holiday		
Summer Term	**Work, Energy and Power**	Types of energy Force-distance graphs Power Efficiency	**Year 12 Mock - Secure AS Paper, 90 minutes** **Required practical - Young's modulus**
	Materials	Density Springs Deformation of solids	Possible 2nd: Materials test
	Half-term		
	Practical work	Following methods, using equipment, working safely, recording observations and reporting findings.	**Required practicals – Gas Laws, SHM of pendulum and Mass-spring, Inverse square law of radiation**
	Gas Laws (A2)	Boyle's, Charles' and Pressure Laws Ideal gas equation Kinetic theory of gases	Possible tests: Gas laws and Thermal Physics
	Thermal Physics (A2)	Internal energy Specific heat capacity Specific Latent heat	

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Course Outline: A-Level Physics Year 13

Year 13 starts with Circular Motion which is a key topic for understanding SHM, gravitational fields and the motion of charged particles in magnetic fields. Together, SHM and Circular Motion make up the Further Mechanics section which alongside all content from Y12 will be tested in Paper 1 of the final exams and is the material tested in the Year 13 mock exam. Sections on Fields, and Nuclear Physics along with Thermal and Gas from the summer of Year 12 make up the content of Paper 2. Paper 3 tests practical work and the option unit Astrophysics or Turning Points.

	CONTENT	KEY/FUNDAMENTAL CONCEPTS	ASSESSMENT
Autumn Term	**Circular Motion (Further mechanics)**	Motion in a circle which links to SHM, Gravitational Fields and Magnetic Fields	**1st: Circular Motion and SHM test** 1 hour, past paper questions Possible 2nd: Gas Laws and Thermal Physics (A2 from end of Y12 – not on mock)
	SHM (Further Mechanics)	Periodic motion. Examples of oscillating systems Resonance	
	Electric Fields	Uniform fields and point charges Field strength Electric Potential Coulomb's Law	
	Half-term		
	Gravitational Fields	Gravitational field strength and potential Newton's Law of Gravitation Planetary fields and satellite motion	**Year 13 Mock Exam - A-Level Paper 1 Content (All of AS plus SHM and Circular motion. 2 Hours, Long answer questions and multiple-choice section)**
	Capacitors	Capacitance Energy in a capacitor Charging and discharging capacitors Dielectrics	Possible 2nd: Gravitational Fields **Required practical – capacitor discharge**
	Magnetic Fields	Currents in magnetic fields Moving charges in magnetic fields Charged particles in orbits	**Required practical – Force on conductor in magnetic field**
	Christmas Holiday		

Spring Term	**Radioactivity** **Electromagnetic Induction**	Nucleus Nuclear radiation Dangers and uses Decay NZ graph Nuclear radius Generating Electricity Lenz's and Faraday's laws AC generator Transformers	**1st: Electric fields and capacitors** Possible 2nd: Magnetic fields Electromagnetic induction **Required practical – magnetic flux linkage**
	Half-term		
	Nuclear Energy **Option Topic: Astrophysics (SJF) or Turning Points (SA)**	Energy and mass Binding energy Fission and fusion Thermal nuclear reactor Astrophysics: Telescopes Turning points: Discovery of electron	**1st: Radioactivity and Nuclear Physics test** Possible test on option topics
	Easter Holiday		
Summer Term	**Option Topic: Astrophysics (SJF) or Turning Points (SA)** **EXAMS**	Astrophysics: Stars, Cosmology Turning points: Wave-particle duality, Special relativity	**Practice questions and revision**
	Half-term		
	EXAMS	**Paper 1: Y12 content and Further Mechanics** **Paper 2: Fields, Nuclear and Thermal** **Paper 3: Option unit plus practical questions from across the specification**	2 hours: Long answers and multiple choice 2 hours: Long answers and multiple choice 2 hours: Long answers