

## Year 12 Physics

### What we do:

We prepare students for the AQA two year A-level course. AQA split the curriculum between Year 1 and Year 2 and we follow this split. Whilst all students start the course aiming to complete the full two years we do sometimes have students sit the AS Level after one year. To ensure students can do the AS Level we teach all the AS Level content first, and then teach the A-level content at the end of Year 12 and into Year 13. We offer the course to students with a Grade 6+ at GCSE Physics, with a 6+ in GCSE Mathematics. We recommend students also study A-level Maths alongside Physics, but we do have a handful of students who choose not to study A-level Maths.

### Why we do this:

We normally have two teachers teaching the course as this is more robust than just having one teacher.

We arrange the topics to offer variety as well as increasing the level of difficulty in many later topics. They build on previous knowledge and this necessitates such sequencing and promotes retrieval.

We have an entry requirement for the course as we know from national figures that students who are below this threshold tend not to succeed.

We put in place intervention for weaker students from the start of the course because we know from national figures that students with, for example, a Grade 6 at GCSE tend not to be very successful. We also put in place support for students who are not studying A-level Maths to ensure that they have the required understanding of Mathematics needed for A-level Physics.

The course structure allows for students to finish after one year and certificate at AS Level but this is never the intention at the start of the year but the rather the result of a student's change in circumstances (e.g. change in location or gaining employment).

Methods of deepening and securing knowledge:	
Spaced practice	Mechanics and Further Mechanics topics are also taught in A-level Mathematics (and A-level Further Mathematics). Physics teach this topic in Spring term two after Further Maths, and at the same time as Maths to reinforce the teaching of this topic. Nearly all topics are visited on more than one occasion throughout the two years of Physics provision. This is sometimes to re-visit topics in preparation for assessments. On other occasions it is to prepare for the learning of deeper and more challenging learning within the same concept area. In Year 13 there is assumed knowledge from sections 1 to 6.1 (AS content) which is embedded throughout the topics only covered at A-level.
Retrieval practice	All topics build on the ideas at GCSE and all lessons have retrieval questions aimed at retrieving either GCSE knowledge or knowledge from previous lessons. All topics can interleave with the other topics, so any topic already taught is revisited as part of the new learning. The regular Aiming High assessments require a similar revisiting of previous understanding.
Elaboration	Topics throughout the A-level naturally build and elaborate on what has been previously taught. As each new topic is taught it expands and elaborates on previous topics.
Interleaving	Most topics are visited on multiple occasions throughout the two years of Physics provision as they linked to new areas of learning and other concepts that are brought together in larger assessments. There are also concepts that occur in different subjects across the school that link the Physics curriculum with the curriculum of other subjects across the school.

Concrete examples	There are many abstract concepts taught throughout the Physics curriculum. The teaching of concrete examples are used either to make them more accessible or because of the requirements of assessments.
Dual coding	Students will encounter many examples of graphical or diagrammatic representations of numbers and mathematical concepts. Students are encouraged to re-vision exam questions in the form of diagrams.

	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
Topic(s)	<p><b>Measurement and errors</b></p> <ul style="list-style-type: none"> <li>- Uses of SI units and their prefixes, limitation of physical measurements, estimation of physical quantities</li> </ul> <p><b>Particle and radiation particles</b></p> <ul style="list-style-type: none"> <li>- Constituents of the atom, stable and unstable nuclei, particles antiparticles and photons, particle interactions, classification of particles, quarks and antiquarks, applications of the conservation laws</li> </ul> <p><b>Electromagnetic radiation and quantum phenomena</b></p> <ul style="list-style-type: none"> <li>- The photoelectric effect, collisions of electrons with atoms, energy levels and photon emission, wave-particle duality</li> </ul> <p><b>Electricity:</b></p> <p><b>Current electricity</b></p> <ul style="list-style-type: none"> <li>- Basics of electricity, current voltage characteristics, resistivity, circuits, potential divider, electromotive force and internal resistance</li> </ul>		<p><b>Waves</b></p> <ul style="list-style-type: none"> <li>- Progressive and stationary waves, longitudinal and transverse waves, principle of superposition of waves and formation of stationary waves</li> </ul> <p><b>Refraction, diffraction and interference</b></p> <ul style="list-style-type: none"> <li>- Interference, diffraction, refraction at a plain surface</li> </ul> <p><b>Mechanics:</b></p> <p><b>Force, energy and momentum</b></p> <ul style="list-style-type: none"> <li>- Scalars and vectors, moments, motion along a straight line, projectile motion, Newton's laws of motion, momentum, work energy power, conservation of energy</li> </ul>		<p><b>Revision for PPE</b></p> <p><b>Preparation for AS exams</b></p> <p><b>Radioactivity</b></p> <ul style="list-style-type: none"> <li>- Rutherford scattering, alpha beta and gamma radiation, radioactive decay, nuclear instability, nuclear radius, mass and energy, induced fission, safety aspects</li> </ul> <p><b>Further mechanics</b></p> <p><b>Periodic motion</b></p> <ul style="list-style-type: none"> <li>- Circular motion, simple harmonic motion, simple harmonic systems, forced vibrations and oscillations</li> </ul>	

	<b>Materials</b> - Bulk properties of solids, the Young's modulus					
Assessment	- AHT Topic reviews	- AHT Topic reviews - Aiming High 1 assessment	- AHT Topic reviews	- AHT Topic reviews - Aiming High 2 assessment	- AHT Topic reviews	- AHT Topic reviews - Aiming High 3 assessment

**Independent Learning:**

Regular independent learning is set to establish, reinforce, and revisit key concepts throughout the course.  
 Isaac Physics Boards (online) are set as independent learning activities as well as booklets of past paper questions.  
 Revision tasks are set on the run up to the Aiming High assessments.  
 Some topic reviews are done at home as part of independent learning.