THOMAS ALLEYNE`S HIGH SCHOOL

A level Physics LEARNING JOURNEY

OPPORTUNITY · PROGRESS · INDIVIDUALITY

University

POST-18 PATHWAY

Higher Apprenticeships

Year 13

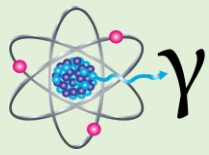
Year 12

WELCOME

Transition days and Bridging work

Final Exams

Students learn about some of the exciting applications of physics in medicine. They use their understanding of photons from quantum physics to explain how X-Rays interact with the body. They also apply their understanding from Particle and Nuclear Physics to explain how Radionuclides are used to treat and diagnose illness and how PET scanners work to produce images of the body.



In this module, students delve into the structure of the nucleus and the particles which make it up. They also study nuclear reactions and fission and fusion. Through the study of radioactive decay, students get another opportunity to analyse exponential decay, drawing parallels with their work on capacitors.

Medical Physics

Particle and Nuclear Physics

Capacitors and Electromagnetism

Mock Exam

In this module, students study gravitational fields. They then combine this with techniques developed in while studying circular motion to explain the behaviour of orbiting systems such as planets and satellites. They go onto study the life of a star, drawing on their understanding of gases to explain the motion of particles starts. Finally, they study cosmology and the nature of the universe, using their understanding of waves from Y12 to explain Hubble Law.

Students use their prior understanding of electricity to explain the behaviour of capacitors in ciruits. By doing this, they also develop an appreciation for exponential decay and how to model it. In Electromagnetism, students analyse electric and magnetic fields and look at how these are applied in motors, generators and transformers.

Further Mechanics

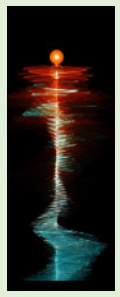
Gravity and Astrophysics

Thermal Physics and Gases

Students use their understanding of force and motion developed in Y12 to analyse the motion of objects in circular motion and oscillating systems. They draw on their prior understanding of energy to explain the energy transfers taking place in a range of oscillating systems such as suspension bridges and pendulums.

Using ideas of momentum and collisions developed in mechanics, students analyse the motion of particles in gases and how changes in temperature, pressure and volume are interrelated. Extending from their work on energy, students study the effect of changes in thermal energy as objects heat and cool.

In this exciting module, students get their first glimpse into the quantum world and the particle nature of light. They learn about the photoelectric effect and its significance in the 20th century debate about the nature of light. This lays important foundations for future study in medical physics



Starting from elastic behaviour and Hooke's Law learnt at GCSE, students develop a broad understanding of materials and their properties including concepts such as strain, stress, plasticity and stiffness. This is a useful grounding for future careers in a range of engineering and material science disciplines.

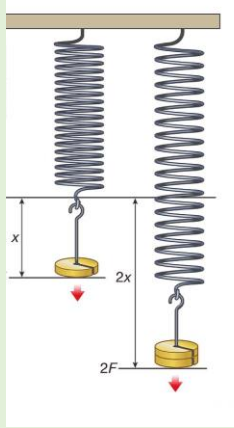
Y12 Trial Exams

Quantum Physics

Materials

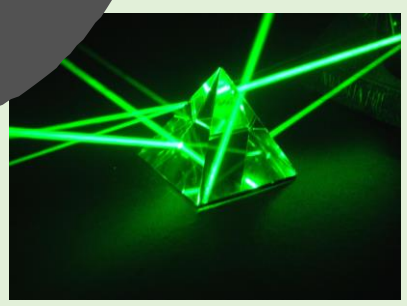
Having seen a range of scenarios in the mechanics module, students analyse the energy changes which take place. This builds on the work carried out on energy throughout the GCSE course and extends it to consider more complex systems. They will use this understanding in year 13 to study energy changes in oscillating systems.

Having developed a deeper understanding of energy, students complete an in depth study of energy transfers through waves. They explore a range of applications of the electromagnetic spectrum. They are introduced to ideas around phase and interference of waves which they use to explain the findings of the historic 'Young's Double Slit' experiment, proving the wave like nature of light. They revisit the conclusions from this in the next module on Quantum Physics They finish this module by drawing together all of their work on wave behvaiour to explain the formation of stationary waves and their applications to sound and music.



Work and Energy

Waves



Alongside their study of mechanics, students study electrical circuits. This starts from their preexisting understanding from the GCSE topic 'Electricity' and develops this further by looking in more detail at the nature of charge current and resistance in a range of more complex circuits, including circuits used to control appliances in the home. This topic finishes with the more challenging circuits allowing students to analyse the behaviour of 'real' electrical circuits where batteries have their own internal resistance.

Electrical Circuits

Mechanics

Foundations in Physics

The first large module is mechanics. This builds on familiar work from the GCSE topic 'Force and Motion' whereby students develop their ability to formally describe and explain motion as well as solve more complex physical problems.

Students start the A level course with the short foundations of Physics topic. This develops the core mathematical tools from GCSE Maths to enable students to analyse 2D space. They also learn about units, estimations and