CURRICULUM AND ASSESSMENT PLAN

YEAR 12 | A LEVEL PHYSICS

'Becoming a Physicist'

The curriculum and assessment of students at this stage of education has been carefully designed to develop students into physicists, focusing on deepening understanding gained at GCSE:

Building on the fundamental concepts taught at KS4, students will begin by revisiting and building on these in module 2. After the foundation content is completed our approach to teaching will involve parallel teaching of the forces & motion module along with electricity and waves, further securing, and utilising, their understanding of 'foundation knowledge' in physics. Embedded within the curriculum will be opportunities for students to think more critically about physical processes, with an added emphasis on developing higher level practical skills. By the end of the year, students will have acquired the key knowledge and skills needed to succeed in year 13. Students will gain an understanding of more specialist apparatus, and explore routes into a number of careers. We will refer to facts from local, national and global sources to further broaden students' knowledge of the universe.

HALF TERM 1

All students will know:

Module 2 – Foundations of physics

- SI Base units, including checking homogeneity of equations, and prefixes and symbols for multiples of units.
- How to work with vector and scalar quantities.
- How to deal with uncertainties in data.

Module 3 - Forces and Motion

- Motion (kinematics, linear motion, projectile motion).
- Forces in action (dynamics, motion with non-uniform, acceleration, equilibrium, density and pressure).

Module 4 - Electrons, waves and photons

- Understanding electric current and charge.
- Energy power and resistance.

All students will be assessed:

End of chapter tests

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

S.I base unit, Percentage uncertainty, absolute uncertainty, vector, scalar, projectile, displacement, acceleration.

HALF TERM 2

All students will know:

Module 3 - Forces and Motion

- Forces in action (dynamics, motion with non-uniform, acceleration, equilibrium, density and pressure).
- Work energy and power (work and conservationof energy, Kinetic and potential energy, power).
- Materials (springs, mechanical properties of matter).
- Newton's laws of motion and motion & momentum (Newton's laws and collisions).

All students will be assessed:

- End of chapter tests

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Force, mass, acceleration, reaction, momentum, velocity,collision, explosion, conservation of momentum, Newton, Hooke's Law, tensile, stress, strain, extension, Young's modulus,elastic limit, deformation, hysteresis loop, Work, power, Kinetic energy, Gravitational potential energy, efficiency.

CURRICULUM AND ASSESSMENT PLAN

YEAR 12 | PHYSICS

ENRICHMENT OPPORTUNITIES

KS5 students are invited to act as student leaders for KS3 STEM, OAT LP Days, University visits, OAT organized international trips.

HALF TERM 3

All students will know:

Module 4 - Electrons, waves and photons

- Understanding electric current and charge.
- Energy power and resistance.
- Electric circuits (series and parallel circuits including Kirchoff's laws, internal resistance and potential dividers).

All students will be assessed:

End of chapter tests

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Current, charge, elementary charge, mean drift velocity, resistance, potential difference, electromotive force, Amp, Coulomb, Series, parallel, internal resistance, potential divider.

HALF TERM 4

All students will know:

Module 4 - Electrons, waves and photons

- Waves (wave motion, longitudinal and transverse waves,the wave equation).
- Waves (Electromagnetic waves, superpositionof waves and stationary waves).

All students will be assessed:

- End of chapter tests
- Mock examination.

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Electromagnetic spectrum, longitudinal, transverse, frequency, total internal reflection, critical angle, refraction, polarisation, path difference, constructive interference, destructive interference, superposition, node, antinode, harmonic, amplitude, phase difference, wavelength, intensity.

HALF TERM 5

All students will know:

Module 4 - Electrons, waves and photons

- Quantum Physics (Photons, the photoelectric effect,wave particle duality).

All students will be assessed:

End of chapter tests

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Photon, photoelectric effect, de Broglie wavelength, Planck's constant, electrons.

CURRICULUM AND ASSESSMENT PLAN

YEAR 12 | PHYSICS

ENRICHMENT OPPORTUNITIES

KS5 students are invited to act as student leaders for KS3 STEM, OAT LP Days, University visits, OAT organized international trips.

HALF TERM 6

All students will know:

This half term is left flexible, depending on students' needs. We may revisit topics they were less confident in, or begin the research PAG assessment. We may also start yr 13 content. (Thermal Physics).

All students will be assessed:

End of topic test (if topic completed).

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

HOW STUDENTS CAN BE SUPPORTED AT HOME

Revision guides are available to purchase in school. Content from Kerboodle shared with students for extra practice.

HOW THIS LEARNING WILL BE EMBEDDED ELSEWHERE IN THE CURRICULUM

A level Maths - particularly mechanics topic.

A level Chemistry - atomic structure.

CURRICULUM AND ASSESSMENT PLAN

YEAR 13 | A LEVEL PHYSICS

'Becoming a Physicist'

The curriculum and assessment of students at this stage of education has been carefully designed to promote deep learning of Science and develop students into Physicists:

In year 12, students will have covered all of the AS level content and will have sat AS level Physics papers as mock exams. This will have included development of the key skills that enable students to analyse the complex ideas that are introduced to them in the A level physics course. A key theme throughout the entire A-level physics course is to prepare students for further study or work in physics in the future. This includes having discussions, which go far further than what is needed for their exams, as well as working on spreadsheet programming skills which are sadly overlooked on the A-level specification.

HALF TERM 1

All students will know:

Module 5 - Newtonian world and astrophysics

- Thermal physics (Internal energy, temperature, SHC, SLH).
- Ideal Gases (Kinetic theory, Gas laws, RMS, Boltzman).
- Circular Motion (angular velocity, angular acceleration, centripetal force).

Module 6 - Particles and medical physics

- Capacitors (circuits, energy, charging, discharging, uses).
- Electric fields (Coulomb's law, particles in electric fields, electric potential).
- Magnetic fields (particles in magnetic fields, electromagnetic induction, transformers).

All students will be assessed:

- Topic tests.
- Structured checks on completion of past paper questions in their own time.

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Thermal equilibrium, absolute zero, Kelvin, Brownian motion, specific heat capacity, specific latent heat, Avogadro constant, Boyle's law, root mean square speed, Boltzmann constant, ideal gas, angular velocity, radian, centripetal force, Farad, Coulomb, Tesla, magnetic flux, velocity selector.

HALF TERM 2

All students will know:

Module 5 - Newtonian world and astrophysics

- Oscillations (SHM, damping, resonance).
- Gravitational fields (Newton's law of gravitation, field around a point mass, Keplar's laws, satellites, gravitational potential).

Module 6 - Particles and medical physics

- Particle Physics (alpha scattering experiment, the nucleus, particles and antiparticles, hadrons and leptons, quarks, beta decay).
- Radioactivity (nuclear decay equations, half-life and activity, radioactive decay equations, modelling radioactive decay).

All students will be assessed:

- Topic tests.
- Structured checks on completion of past paper questions in their own time.

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Simple harmonic motion, amplitude, damping, free and forced oscillations, resonance, gravitational field strength, geostationary orbit, gravitational potential, escape velocity, Isotopes, antiparticle, positron, hadron, lepton, quark, baryon, meson, neutrino, spontaneous, decay constant.

CURRICULUM AND ASSESSMENT PLAN

YEAR 13 | PHYSICS

ENRICHMENT OPPORTUNITIES

Opportunity for IOP lectures at the University of Birmingham, ongoing discussions beyond the scope of the course.

HALF TERM 3

All students will know:

Module 5 - Newtonian world and astrophysics

- Stars (objects in the universe, life cycle of stars, H-R diagrams, energy levels and spectra, analysing starlight and stellar luminosity).
- Cosmology (Astronomical distances, doppler effect, Hubble's law, the big bang theory and evolution of the universe).

Module 6 - Particles and medical physics

- Nuclear physics (Einstein's mass-energy equation, binding energy, fission and fusion).
- Medical imaging (X-rays, CAT scans, gamma camera, PET scans, ultrasound).

All students will be assessed:

- Topic tests.
- Structured checks on completion of past paper questions in their own time.

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

Key vocabulary:

Planet, comet, solar system, galaxies, nebula, main sequence, reg giant, neutron star, electron degeneracy pressure, supernova, black hole, emission spectra, absorption spectra, maxima, luminosity, astronomical unit, light year, parsec, doppler, Hubble's law, cosmological principle, homogeneous, isotropic, CMBR, dark matter, dark energy.

HALF TERM 4

All students will know:

- Preparation for unified concepts paper.
- Recap ideas on course.
- Discuss how different topics can be linked and practice questions where this is the case.
- Completing any missed PAGs (required practicals) and improving weaknesses in any practical skills.

All students will be assessed:

- Past paper mocks.
- Physics PAG tracker.
- Structured checks on completion of past paper questions in their own time.

Reading skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

HALF TERM 5

All students will know:

Preparation for exams.

All students will be assessed:

- Practice questions.
- OCR A-level Physics exam.

Reading Skills needed for this unit:

- Command words.
- Extracting information from various parts of a text.
- Comprehension.

CURRICULUM AND ASSESSMENT PLAN

YEAR 13 | PHYSICS

ENRICHMENT OPPORTUNITIES

Opportunity for IOP lectures at the University of Birmingham, ongoing discussions beyond the scope of the course.

HALF TERM 6

All students will know:

Preparation for exams.

All students will be assessed:

» OCR A-level Physics exam.

Reading Skills needed for this unit:

» Command words.
» Extracting information from various parts of a text.
» Comprehension.

HOW STUDENTS CAN BE SUPPORTED AT HOME

» Revision guides are available to purchase in school.
» www.physicsandmathstutor.com
» OCR website.
» Learning guide available in sixth form common room.

HOW THIS LEARNING WILL BE EMBEDDED ELSEWHERE IN THE CURRICULUM

Maths - Embedded throughout the course, many aspects included such as: manipulating equations, gradients and areas on graphs, logarithms, exponentials and more.