Physics A Level — Key Stage 5 Curriculum Plan — Year 13

Exam Board: *AQA*
Qualification: *GCE Physics 7408*
Assessment Information: *Paper 1 (chapter1-13, 17-18), Paper 2 (chapters 19-27) and Paper 3 (practical skills & optional topic). Each exam is 120 minutes in length*
Link to official specification

Department Information:
Physics, Biology and Chemistry are popular and successful subjects at Furze Platt. The Department aims to provide a supportive, stimulating, dynamic and academically challenging experience for all students. Over recent years, the Department has gone from strength to strength, and standards and students' results are high.
In Year 13, those students studying the Physics A-level course will receive 9 hours of Physics teaching per fortnight.

ACHIEVE in the curriculum:
*The curriculum has been designed with the ACHIEVE values at its core. Lessons have been written to encourage **ambition** and have also been written with the intent of being enjoyable and giving opportunities for students to celebrate their own successes. **Collaboration** is a key aspect of the scientific method and students will develop this and their **versatility** through required practical activities, as well as through paired and group classwork. Students will develop **integrity** through their completion of independent learning and through self-marking and peer-marking their work. Students will develop **endurance** through the completion of consolidatory activities such as past exam papers.*

Curriculum Aims and Intent:
The AQA A-level Physics course aims to develop students' knowledge and understanding of physical principles, mathematical problem-solving skills, as well as their practical and analytical skills. The curriculum is designed to prepare students for higher education or careers in scientific fields while developing a passion for physics.

- *Develop understanding of key physical concepts such as forces & motion, electrical circuits and waves*
- *Apply knowledge by equipping students with the ability to apply mathematical equations and physical laws to new and unfamiliar contexts, including problem-solving and decision-making.*
- *Enhance practical skills by promoting proficiency in practical and experimental skills through hands-on lab work, encouraging students to develop scientific inquiry, observation, and measurement skills.*
- *Develop analytical and critical thinking by fostering by interpreting data, analysing trends, and evaluating the reliability of information from experiments or secondary sources.*
- *Prepare for higher education and careers by laying the foundation for further study in physics, engineering, or related fields, and prepare students for scientific and non-scientific careers by developing transferable skills such as data analysis and problem-solving*

- *Instil a passion for Biology by cultivating a deeper interest in the Universe big and small.*

Resources:

Summer transition work: HeadStart to A-level Physics (CGP Guide) ISBN-13: 9781782942818
Oxford University Press A-Level Biology textbook (available on Kerboodle and Amazon) ISBN-13: 978-0-19-835187-0
Kerboodle https://kerboodle.com
PMT (for past paper questions) https://www.physicsandmathstutor.com/physics-revision/a-level-aqa
Youtube: Science shorts, A-level Physics online

How we keep parents informed:

Year 13 - Progress reports are published 4 times per year, in October, November and February, with a face-to-face parents' evening in December.

How parents can help their child:

- *Ensue that students are consolidating their learning after every lesson. Students should be spending at least 9 hours per fortnight consolidating their learning with flash cards, completing set questions from the textbook*
- *Ensuring that students are actively engaged with their learning through the regular use of mind maps, flash cards, blurting etc.*
- *Encourage the completion and marking of past paper questions*
- *Encourage students to explore beyond the specification (documentaries, podcasts, reading of scientific journals, keeping abreast of scientific developments in the news)*
- *Liaise with teachers and attend Parents' evening*

What we study and when:					
Term	**Unit, Topic or Summary of Work Covered**	**Knowledge, Understanding & Skills Developed**	**ACHIEVE / Personal Development Focus**	**How The Work Is Assessed**	**Careers Links**
1	**Ch17 Circular Motion & CH18 Simple Harmonic Motion**	**Knowledge:** Students learn the principles of circular motion, including angular displacement, velocity, and acceleration, as well as the concept of uniform circular motion. They explore simple harmonic motion (SHM), focusing on the characteristics of oscillating systems and the mathematical relationships governing them. **Understanding:** Pupils gain an understanding of the interrelation between linear and angular quantities, the role of forces in circular motion, and the energy transformations in SHM. They also appreciate the significance of periodicity in both contexts. **Skills developed:** Problem-solving skills through analysing and solving equations related to circular motion and SHM Investigating S.H.M. through practical tasks relating to simple pendulums and oscillating spring systems	Collaboration: Students work together during required practical Versatility: Students apply principles to different scenarios in physics and engineering	End of topic test Ch17 & 18 Assessed required practical 7	Civil and mechanical engineering Seismology
1	**Ch21 Gravitational Fields & Ch22 Electric Fields**	**Knowledge:** Students learn the fundamental concepts of gravitational and electric fields, including the inverse square law, field lines, and the definitions of gravitational and electric potential. They explore the properties of forces acting on masses and charges within these fields. **Understanding:** Students gain an understanding of the similarities and differences between gravitational and electric fields, the concepts of field strength, potential energy, and the relationship between force and distance. They also examine the implications of these fields in various physical contexts. **Skills:** Students develop problem-solving skills by calculating forces, potentials, and energy in gravitational and electric fields. They mathematically analyse and link equations in the fields topic	Ambition: Students aim to solve the trickiest problems with large distances and orbital bodies Endurance: Students apply various equations repeatedly to make sure they are exam-ready	End of topic test Ch21 & 22	Astrophysicist Satellite engineer Electrical engineering
2	**Ch19 Thermal Physics &Ch20 Gases**	**Knowledge:** Students study the properties of gases, including the gas laws (Boyle's, Charles's, and Avogadro's laws) and the ideal gas equation. They learn about	Collaboration: Students work together during required practical	End of topic test Ch19 & 20	Mechanical engineering, car

		temperature, pressure, volume relationships, and the concepts of kinetic theory and thermal energy. **Understanding:** Pupils develop an understanding of the molecular basis of gas behaviour, the distinction between ideal and real gases, and the principles of thermodynamics. They explore concepts like heat transfer, internal energy, and the laws of thermodynamics. **Skills developed:** Analytical skills through problem-solving involving gas laws and thermal calculations. Experimental skills to measure gas properties, analyse data, and apply statistical methods to understand molecular behaviour in gases.	Ambition: Students aim to solve the trickiest problems with large numbers of gas molecules Versatility: Students apply principles from Physics & Chemistry to different scenarios	Assessed required practical 8	manufacturing use knowledge of engines
2	**Ch23 Capacitance**	**Knowledge:** Students learn the fundamentals of capacitance, including the definition of capacitance, the formula $C = Q / V$, and the principles governing capacitors and how they charge and discharge They explore the energy stored in a capacitor and the factors affecting capacitance. **Understanding:** Pupils develop an understanding of how capacitors function in electrical circuits, the concept of dielectric materials, and the relationship between electric fields and capacitance. They also study the role of capacitors in filtering and timing applications. **Skills:** Students enhance their analytical skills through calculations involving capacitance, energy storage, and circuit behaviour. They conduct experiments to measure time constant of a capacitor, capacitance and analyse data.	Ambition: Students analyse problems related to tricky capacitor circuits Collaboration: Students work together during required practical	Ch23 End of topic test Assessed Required practical 9	Electrical engineering Electronics manufacturing
3	**Ch26 Radioactivity** **&** **Ch27 Nuclear energy**	**Knowledge:** Students learn the principles of radioactivity, including types of radioactive decay (alpha, beta, and gamma), half-life, and radioactive isotopes. They study nuclear fission and fusion, as well as the concepts of binding energy and mass-energy equivalence. **Understanding:** Pupils develop an understanding of the interactions between radiation and matter, the safety	Collaboration: Students work together during required practical Versatility:	Ch26 & 27 end of topic test Assessed Required practical 12	Nuclear medicine Radiotherapy, MRI technologist Nuclear reactor design and manufacture

		measures for handling radioactive materials, and the applications of nuclear energy in power generation and medicine. They explore the implications of radioactivity in environmental and health contexts. **Skills:** Students enhance their analytical skills by calculating decay rates, half-lives, and energy release in nuclear reactions. They conduct experiments to measure radiation and analyse data, strengthening their skills in experimental design and safety protocols in nuclear physics.	Complex problems containing logarithms and cross over content from Chemistry Ambition: Students analyse problems related to tricky radiation concepts		Nuclear physicist
3	**Ch24 Magnetic Fields & Ch25 Electromagnetic Induction**	**Knowledge:** Students learn the principles of magnetic fields, including magnetic field lines, magnetic force on charged particles, and the right-hand rule. They study electromagnetic induction, Faraday's law, and Lenz's law, as well as the operation of generators and transformers. **Understanding:** Pupils develop an understanding of the relationship between electricity and magnetism, the concept of magnetic flux, and how changing magnetic fields induce electromotive force (EMF). They explore the applications of electromagnetic induction in technology and energy systems. **Skills:** Students enhance their analytical skills through problem-solving related to magnetic fields and induced EMF. They conduct experiments to investigate magnetic forces and induction, analysing data to reinforce their practical skills in circuit design and electromagnetic applications.	Collaboration: Students work together during required practical Ambition: Students aim for a complete understanding of Faraday's law involving rate of change of flux, and how EMF induced changes in a generator	Ch24 & 25 end of topic test Assessed Required practical 11	Power station design Power systems engineer
4	**Optional topic (Astrophysics, Engineering, or Turning Points in Physics)**	All students in the same class study an optional topic for AQA, usually democratically decided between 3 of the 5 options available. Most common has been "Engineering": **Knowledge:** Students learn fundamental engineering principles, including mechanics, materials science, and thermodynamics. They explore concepts such as stress, strain, circular motion, and energy transfer, laws of thermodynamics and how they are used in engines	Versatility: Students can synoptically use different elements of the course to link together – e.g. Thermodynamics & circular motion	End of topic test (past paper section)	Mechanical engineering, automotive engineering

		Understanding: Pupils develop an understanding of how to apply physics principles to real-world engineering problems, focusing on design processes, efficiency, and safety. They learn about the importance of sustainability and ethical considerations in engineering practices, and how engineering solutions impact society and the environment. **Skills:** Students enhance their problem-solving and analytical skills through exam questions on different scenarios They gain experience in performing calculations related to forces and energy.			
	Pre-study leave	• Past paper practice • Required practical re-cap • Definitions and key concepts from Year 12	Endurance: Students complete various revision activities, past papers and similar tasks both for independent learning and in class Ambition: Students walked through the hardest types of questions needed to obtain the highest grade!		