Subject Curriculum Overview for Academic Year 2022/2023

Subject: Physics	Subject Leader: Hugo Crossley	Year Group: 13	AUTUMN TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
7: Electric and Magnetic Fields	*End Point: To understand how electric and magnetic fields affect the movement of charged particles, the operation of capacitors and the creation of electric currents.* • Know the definition of an electric field, and how fields are shaped around point charges and between parallel plates. • Explain the concept of electric potential, and know how to calculate forces between two charges. • Explain how electric fields allow charge and energy to be stored in capacitors. • Describe how magnetic fields exert forces on moving charges, and how this effect is used in electric motors, particle accelerators and spectrometers. • Explain how changing magnetic fields give rise to electromotive forces, which in turn cause currents to flow in electric circuits.	(Radial) field Electric potential Equipotential Capacitance Time constant Magnetic flux Flux density Flux linkage Lenz's law Peak voltage RMS voltage	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • Students have test weeks in late October and mid-December. **Homework and Independent study:** • Students complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions.
8: Particle Physics	*End Point: To understand how matter around us is made up of fundamental particles, other forms of matter that these particles can make up, and how these particles are discovered.* • Describe how our model of the atom has changed over history, the particles that are now known to constitute an atom, and how they are arranged. • Explain how electrons may be ejected from atoms. • Describe different types of particle accelerator, and explain how colliding beams of particles can lead to the creation of new particles. • Describe some different types of particle detector, and how they work. • Explain how nuclear particles that were once thought to be fundamental are actually made up of quarks, and how quarks are arranged in other particles. • Explain the difference between baryons and mesons. • Describe the boson particles that transmit the fundamental forces of nature.	Nucleon Isotope Thermionic Linear accelerator Cyclotron Synchrotron Bubble chamber Pair production Annihilation Standard Model Quarks Boson	
9: Thermo-dynamics	*End Point: To understand how kinetic theory can be used to explain heat energy storage in materials, and the behaviours of gases.* • Explain what is meant by the 'internal energy' of a material, how this relates to its temperature, and how transfers of heat energy affect the properties of an object. • Describe how a body's electromagnetic radiation depends on its temperature. • Explain how the properties of a gas can be derived from the movement of its particles.	Kinetic theory Absolute Zero Internal energy Specific/latent heat Black body radiation Ideal gas	
11: Gravitational Fields	*End Point: To understand the cause of gravitational fields, and how they affect the motion of a body with mass.* • Explain how mass causes gravitational fields, and describe their shape. • Describe how a gravitational field affects a body with mass.	Gravitational field Gravitational potential Satellite	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Physics	Subject Leader: Hugo Crossley	Year Group: 13	SPRING TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
12: Space	*End Point: To understand the lifecycle of stars, and how studying the stars allows us to examine the past and predict the future of the Universe.* • Explain how the radiation from a star depends on its size and temperature. • Describe the lifecycle of stars, and how this depends on their size. • Explain how scientists estimate the distances to stars. • Explain what is meant by red-shift, and how the observed red-shift of stars and galaxies tells us how the Universe is currently evolving. • Know how observations of objects in the Universe are enabling scientists to explain its past, and make predictions of its eventual fate.	Luminosity Wien's law Main sequence Parallax Red shift Hubble's law Hubble Constant The Big Bang/Crunch Dark matter/energy	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • Students have test week in late February. **Homework and Independent study:** • Students complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions. • Students complete write up and discussion of practical work in their lab book.
13: Oscillations	*End Point: To understand the recurrent phenomenon of simple harmonic motion, which allows us to predict how an oscillating system will behave.* • Describe the conditions that are required for simple harmonic motion to occur. • Explain how the motion of any system undergoing simple harmonic motion can be described by the same set of equations. • Describe how energy is transferred between stores within an oscillating system. • Explain the difference between a free oscillation and a driven oscillation. • Describe the phenomenon of resonance, explain when it occurs and describe some ways that it can be prevented when necessary. • Describe how oscillating systems are damped, in terms of forces and energy transfers.	Simple harmonic motion Natural frequency Resonance Free oscillation Driven/forced oscillation Damping Critical damping	
Revision	See the section on the next page for information on revision.		

Subject Curriculum Overview for Academic Year 2022/2023

Subject: Physics	Subject Leader: Hugo Crossley	Year Group: 13	SUMMER TERM

Topic	Key Learning Points	Assessments
Revision	Students are guided to structure their revision. Each content topic will be revisited in revision lessons that focus on working with past paper questions. Students have access to lesson resources (accessible on Microsoft Teams) if they need to go back to the original source as well as past paper questions, full past papers for timed practice and extra resources such as the Edexcel A-level Revision Workbook. These should be used for practising recall and embedding question answering skills. To help structure their revision students are provided with a checklist of content, allowing them to assess their areas of strength and weakness, and to decide how beset allocate their revision time to each topic. Students are given a list of purchasable revision resources and class teachers will guide parents at parents evening to the ones that are most helpful for their child. Students are guided to a wealth of online resources to help support their revision. For example: • Seneca Learning • PhysicsAndMathsTutor.com • AlevelPhysicsOnline.com • Isaac Physics Skills The morning of exams there are optional drop in sessions run by subject specialists focused on reinforcing key points for the specific exam of the day as well as boosting confidence.	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • A-level examinations **Homework and Independent study:** • Students complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions. • Students complete write up and discussion of practical work in their lab book.

Subject Curriculum Overview for Academic Year 2022/2023

How parents can support learning in the subject this academic year

All students are provided with their own copy of a text book, revision guide and revision workbook for home and study-room use, but there are a variety of other good resources available including revision guides, revision cards and online resources. Please contact your child's Physics teacher if you would like any direction to appropriate resources that you could buy.

Students in the Sixth Form are expected to complete at least 6 hours of homework and independent study per week for each subject.
In Physics A-level the homework takes the form of:

- Knowledge based questions and question sheets based on past exam questions
- Lab book work
- Reviewing notes from lessons

Parents can support learning by ensuring students use their free time effectively and are completing all of the homework and independent study. In the event that students are struggling with independent work it is helpful if the teacher can be contacted as soon as possible to enable for them to support your child to catch up.

Recommended Reading

Please find below some suggested science books/magazines/websites that students may find interesting. These are linked to the topics that are covered in school and so may extend and strengthen your child's knowledge but are primarily focused on instilling a sense of curiosity and wonder:

- A Short History of Nearly Everything – Bill Bryson
- Atom – Piers Bizony
- We Need to Talk About Kelvin: What everyday things tell us about the universe – Marcus Chown
- Seven brief lessons on physics – Carlo Rovelli
- The Boy Who Harnessed the Wind – William Kamkwamba and Bryan Mealer
- The Universe in Your Hand: A Journey Through Space, Time, and Beyond – Christophe Galfard
- BBC Science Focus magazine (sciencefocus.com), Catalyst magazine (catalyst-magazine.org), New Scientist (newscientist.com)

Points to note

Physics A-level is assessed using three written exams at the end of Y13:

- Paper 1 (1hr 45min long, 30% of the final grade) is based on Topics 1-3 and 6-8.
- Paper 2 (1hr 45min long, 30% of the final grade) is based on Topics 1, 4, 5 and 8-13.
- Paper 3 (2hr 30min long, 40% of the final grade) is based on all topics, with significant focus on questions based around the core practicals.

The assessment of practical skills is a compulsory requirement of the course of study for A level Physics. It will appear on all students' certificates as a separately reported result, alongside the overall grade for the qualification. Students' practical work will be assessed by teachers, using common practical assessment criteria (CPAC) that are consistent across exam boards. Overall, a minimum of 40% of the marks across the three papers will be awarded for mathematics at Level 2 or above.