IGCSE Physics

Cambridge IGCSE Physics is accepted by universities and employers as proof of knowledge and understanding of physics. Successful candidates gain lifelong skills, including:

- an understanding of the usefulness (and limitations) of scientific method, and its application in other subjects and in everyday life
- a concern for accuracy and precision
- an understanding of the importance of safe practice
- an awareness of the importance of objectivity, integrity, enquiry, initiative and inventiveness
- become confident in a technological world, with an informed interest in scientific matters
- develop an understanding of how scientific theories and methods have developed, and continue to develop, as a result of groups and individuals working together
- understand that the study and practice of science are affected and limited by social, economic, technological, ethical and cultural factors
- develop an awareness that the application of science in everyday life may be both helpful and harmful to the individual, the community and the environment
- appreciate that science overcomes national boundaries and that the language of science, used correctly and thoroughly, is universal
- develop an interest in, and care for, the environment Recommended prior learning

The IGCSE Physics syllabus is divided into 8 units. Units 1-4 are studied in Year 9 and Unit 5-8 are taken in Year 10. Each unit covers both the core and supplement material.

B Miller Head of Humanities

Year 9

Topic/Term	Unit 1 – Measurements & Motion / Term 1
Key competencies (student abilities)	This unit is an introductory unit for the course. The core material covers measuring equipment, speed, motion graphs, acceleration, weight and the displacement method. The extended material recaps the basics from the core and introduces the use of a micrometer, pendulums, velocity, acceleration, terminal velocity and the displacement method.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning Charter/IB learner profile	In the course of their practical work, candidates will gain an understanding of the scientific method and the importance of integrity in reporting results. They also have the opportunity to discuss how scientific developments in the modern world (for example, nuclear power, hydroelectric dams), often pose ethical as well as technological problems. Through their practical work, candidates have the chance to develop their ability to work as a team, where appropriate, and to value others' ideas.

Topic/Term	Unit 2 – Forces, Work and Moments / Term 1
Key competencies (student abilities)	The core material focuses on forces and their resultants, moments, centre of mass, work done, power and pressure. The supplement material focuses on Hooke's law, circular motion, equilibrium, vectors and the equations for work done, power and pressure at depth.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning Charter/IB learner profile	Candidates are encouraged to develop a sense of wonder at the simplicity and universality of physical laws and how these order and give meaning to our view of the ways that nature works. Through their practical work, candidates have the chance to develop their ability to work as a team, where appropriate, and to value others' ideas. Throughout the unit, candidates learn that the laws and language of physics are universal and transcend national and cultural boundaries. Teachers have the opportunity to discuss with their candidates how international collaboration in science is often needed to tackle global problems

Topic/Term	Unit 3 – Energy / Term 2
Key competencies (student abilities)	The core material revolves around energy in terms of its types, transformations, conservation and sources. It also looks at heat transfers in terms of conduction, convection and radiation. The supplement material introduces kinetic and potential energy equations, how to calculate efficiency, molecular accounts of heat transfer and experiments for good and bad emitters.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Project on energy source and its advantages or disadvantages
Links to CES learning Charter/IB learner profile	In the unit of their practical work, candidates will gain an understanding of the scientific method and the importance of integrity in reporting results. They also have the opportunity to discuss how scientific developments in the modern world (for example, nuclear power, hydroelectric dams), often pose ethical as well as technological problems. Candidates have many opportunities to explore the role of applications of physics, for good or ill, in the community and environment. In particular, they study concerns about the issues regarding energy conversion, conservation and resources.

	Throughout the unit, candidates learn that the laws and language of physics are universal and transcend national and cultural boundaries. Teachers have the opportunity to discuss with their candidates how international collaboration in science is often needed to tackle global problems, such as issues surrounding global warming.

Topic/Term	Unit 4 – Thermal Physics / Term 3
Key competencies (student abilities)	The core material introduces the basic concepts of thermal physics, focusing on states of matter, temperature effect on molecular structure, evaporation, thermal expansion, thermometers and internal energy. The extended material builds on from the core material, focusing on distances and motion of molecules in matter, factors of evaporation, applying pV = constant, magnitude of expansions of matter, factors of thermometers, specific heat capacity and latent heat.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning Charter/IB learner profile	Candidates are encouraged to develop a sense of wonder at the simplicity and universality of physical laws and how these order and give meaning to our view of the ways that nature works. They have the opportunity to study physical systems from atomic systems to the solar system, helping them to develop an appreciation of the variety and immensity of the natural world. Candidates have many opportunities to explore the role of applications of physics, for good or ill, in the community and environment.

Year 10 Syllabus Content

Topic/Term	Unit 5 – Waves / Term 1
Key competencies (student abilities)	The core material focuses on wave motion and properties, reflection, refraction, diffraction, rays and lenses, electromagnetic spectrum and sound. The extended material focuses on the wave equation, wave theory, refractive index, Snell's law, optical fibres, lenses, electromagnetic waves, monochromatic, compression and rarefaction and the speed of sound in different mediums.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning	Candidates are encouraged to develop a sense of wonder at the simplicity and universality of physical laws and how these order and give meaning to our view of the ways that nature works.

Charter/IB learner profile	Candidates have many opportunities to explore the role of applications of physics, for good or ill, in the community and environment.

Topic/Term	**Unit 6 – Electricity / Term 1**
Key competencies (student abilities)	The core material introduces the basics of electricity. It focuses on electrostatic charges, electric fields, charge, e.m.f, potential difference, resistance, circuit diagrams and components and hazards and precautions involved in electric cables. The extended material focuses on coulombs, induction, convectional and the flow of electrons, e.m.f, resistance in a wire, equations for power and energy, diodes, transistors and circuit properties.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Project on energy source and its advantages or disadvantages
Links to CES learning Charter/IB learner profile	Candidates are encouraged to develop a sense of wonder at the simplicity and universality of physical laws and how these order and give meaning to our view of the ways that nature works. Candidates must follow good health and safety practice in the laboratory. They also learn about the hazards associated with electricity and gain an understanding of safety measures.

Topic/Term	**Unit 7 – Electromagnetism & Electronics / Term 2**
Key competencies (student abilities)	The core material focuses on magnets, magnetic fields, variable potential dividers, transducers, D.C. and A.C. motors. The extended material looks at diodes as rectifiers, transistors in switching circuits, relays, digital and analogue, logic gates, factors in e.m.f, transformers, energy losses, oscilloscopes and cathode rays.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning Charter/IB learner profile	In the unit of their practical work, candidates will gain an understanding of the scientific method and the importance of integrity in reporting results. They also have the opportunity to discuss how scientific developments in the modern world often pose ethical as well as technological problems. Throughout the unit, candidates learn that the laws and language of physics are universal and transcend national and cultural boundaries. Teachers have the opportunity to discuss with their candidates how international collaboration in science is often needed to tackle global problems

	Candidates must follow good health and safety practice in the laboratory. They also learn about the hazards associated with electricity and gain an understanding of safety measures.

Topic/Term	Unit 8 – Atomic Physics / Term 2 & 3
Key competencies (student abilities)	This unit is the final unit of the year. The core material covers the different types of radiation, radioactive emissions, radioactive decay, half-life, handling radioactive materials safely, the atomic model and the composition of the nucleus. The extended material focuses on radioactive emissions, different types of radiation, scattering of α particles and isotopes.
Assessment	▪ Summative topic test based on Paper 1, 3 and 6. ▪ Lab practicals based on unit content
Links to CES learning Charter/IB learner profile	Candidates have many opportunities to explore the role of applications of physics, for good or ill, in the community and environment. In particular, they study concerns about the containment and disposal of radioactive materials, and issues regarding energy conversion, conservation and resources. Throughout the unit, candidates learn that the laws and language of physics are universal and transcend national and cultural boundaries. Teachers have the opportunity to discuss with their candidates how international collaboration in science is often needed to tackle global problems, such as issues surrounding global warming and radioactive waste disposal. Candidates must follow good health and safety practice in the laboratory. They also learn about the hazards associated with electricity and gain an understanding of safety measures. Candidates must also understand the safety issues raised by working with radioactive materials and radiation.

Examples of homework tasks	▪ Lab reports ▪ Essays ▪ Worksheets on skills (reading & comprehension, graphing, balancing equations) ▪ Questions from textbook ▪ Research ▪ Past paper questions
Study equipment needed	Science students are expected to come equipped with the standard lesson equipment plus various mathematical equipment (ruler, compass, protractor, Scientific calculator) as well as colouring pencils

Useful websites	Resources Cambridge IGCSE Physics web page: www.cie.org.uk/qualifications/academic/middlesec/igcse/subject?assdef_id=879 Cambridge Students – University of Cambridge International Examinations: www.cambridgestudents.org.uk/subjectpages/physics/ Sang, D. Cambridge IGCSE Physics Coursebook with CD-ROM ISBN: 9780521757737 www.lightwave.soton.ac.uk/experiments/periscope/periscope.html www.youtube.com/watch?v=Bl56CcI.kzzc www.phys.virginia.edu/Education/outreach www.physicsclassroom.com/Class/refrn/U14L5a.html www.phy.ntnu.edu.tw/ntnujava/index.php?topic=48 www.phy.ntnu.edu.tw/java/shadow/shadow.html
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