AS and A Level

Physics A

Switching to OCR from Eduqas

Introduction

We are really excited about our GCE Physics A qualification. Whether taking on the AS or the full A Level, this fantastic course is a great qualification for those with an interest in the subject. Why choose Physics A?

- The 'Big Ideas' of Physics are covered
- The topics are selected and structured to underpin the knowledge and understanding needed for the next generation of physicists
- Physics A is enjoyable to teach and learn, giving students the essentials for physics-related higher education courses, as well as many transferable, marketable skills
- There are many opportunities for 'hands-on' practical, linking to our flexible practical assessment model
- The topics of physics are presented in a clear and logical linear order with practical, maths and contextual opportunities highlighted.

Textbook comparison

We have not included a textbook comparison in this switching document as there are a number of textbooks available for each exam board's qualifications, and the order and organisation of content within these textbooks can vary. However, similarities in content across exam boards mean that it is possible to use any textbook for the core content of any board's qualifications. The specification can be used to identify relevant content, as well as that which is not required for a specific qualification. If you need further clarification on any specific content, you can email our Subject Advisor team at science@ocr.org.uk.

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Support from OCR

We offer a range of support to teachers of our qualifications. This includes:

- A dedicated Subject Advisor team, with teaching and assessment experience, available to answer your queries and support your delivery of our qualifications. You can contact us by email at science@ocr.org.uk or by phone on 01223 553998.
- Monthly newsletters highlighting new resources, CPD courses, and other news about our qualifications.
- A wide range of support materials, including handbooks covering practical and mathematical skills, delivery guides, lesson elements, practical activity suggestions, candidate exemplar resources, and more.
- Free access to ExamBuilder, our mock assessment service that allows you to create your own bespoke assessments.
- Termly Science Teacher Networks, giving you the opportunity to meet with other teachers and our Subject Advisors.
- CPD courses, including courses for teachers new to teaching our qualifications and courses on outcomes from previous examination series to help inform your teaching.
- You can also follow and interact with our Subject Advisors on Twitter (@ocr_science).

Key differences

OCR Physics A	Eduqas Physics
Flexible practical assessment allows you to select from our suggested activities or use your own preferred practical activities	Twenty six specified practical work activities.
Practical skills, apparatus and techniques take centre stage, detailed in full at the start of the specification in a separate module (1.2) for **clarity** and prominence	Practical techniques detailed in Appendix B.
A section of **multiple choice questions** in the exams to allow breadth of coverage. 20 in total at AS and 30 at A level.	No multiple choice questions

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Content

The content within the OCR Physics A specification covers the 'Big Ideas' of physics and will be very familiar. We've laid it out to support the co-teaching of the AS and A level and provide a logical linear progression through the A level.

Items which are in one specification, but not in the other are indicated by square brackets [ ].

OCR Physics A	Eduqas Physics
Module 1: Practical skills Planning, implementing, analysis and evaluation Plus all the skills to be covered in the Practical Endorsement	The same practical skills, as mandated by the DfE, are listed in Chapters 7 and 8 of the AQA specification
Module 2: Foundations of physics Physical quantities S.I. units Measurements and uncertainties Scalars and vectors	**1.1 BASIC PHYSICS** S.I. units and their prefixes Homogeneity using units Scalars and vectors Resolving vectors Estimation of physical quantities
Module 3: Forces and motion Kinematics and dynamics Linear motion Projectile motion Motion with non-uniform acceleration Equilibrium and moments Density [and pressure] Work, energy and power Springs Mechanical properties of materials Newton's laws of motion Momentum	**1.1 BASIC PHYSICS** Density Moments and equilibrium **1.2 KINEMATICS** Displacement, speed, velocity and acceleration Derive equations of motion for uniform acceleration in a straight line Bodies falling in a gravitational field with and without air resistance Projectile motion **1.3 DYNAMICS** Newton's 3rd law of motion Free body diagrams Momentum **1.4 ENERGY CONCEPTS** Work done Conservation of energy Work – energy relationship Power as rate of energy transfer Efficiency **2.5 SOLIDS UNDER STRESS** Hooke's law The Young modulus

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OCR Physics A	Eduqas Physics
	Classification of solids Features of force-extension graphs
Module 4: Electrons, waves and photons Charge and current E.m.f. and p.d. Resistivity and resistance Power Series and parallel circuits Internal resistance Potential dividers Wave motion Electromagnetic waves Superposition Stationary waves Quantum physics Photons The photoelectric effect Wave particle duality	**2.1 CONDUCTION OF ELECTRICITY** Charge and current Conduction **2.2 RESISTANCE** Potential difference I-V graphs Ohm's law Power Resistivity [Superconductivity] **2.2 DC CIRCUITS** Application of Kirchhoff's laws Potential dividers Series and parallel circuits E.m.f. and internal resistance **3.1 THE NATURE OF WAVES** Progressive waves Transverse and longitudinal waves Polarisation **3.2 WAVE PROPERTIES** Diffraction with slits or objects Interference and superposition Diffraction grating Stationary and progressive waves **3.3 REFRACTION OF LIGHT** Refractive index and Snell's law Total internal reflection **3.4 PHOTONS** Photons Photoelectric effect and Einstein's equation Atomic energy level diagrams $p=h/\lambda$ for particles of matter and photons [Calculation of radiation pressure on a surface absorbing or reflecting photons] **[3.5 LASERS]** **3.7 PARTICLES AND NUCLEAR STRUCTURE** Quarks and leptons Antiparticles

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OCR Physics A	Eduqas Physics
	Properties of gravitational, weak, electromagnetic and strong forces Conservation of charge, lepton number and baryon or quark number [Neutrino involvement and quark flavour change exclusive to weak interaction]
Module 5: Newtonian world and astrophysics Temperature Solid, liquid and gas Thermal properties of materials Ideal gases Circular motion Centripetal force Simple harmonic oscillations Energy of a simple harmonic oscillator Damping Point and spherical masses Newton's law of gravitation Planetary motion Gravitational potential and energy Stars Electromagnetic radiation from stars Cosmology	**1.5 CIRCULAR MOTION** Period and frequency Radian Angular velocity Centripetal force Equations of motion **1.6 VIBRATIONS** Simple harmonic motion Simple harmonic systems Graphical representations of S.H.M. Free and damped oscillations Forced oscillations and resonance **KINETIC THEORY** pV=nRT pressure exerted by a gas Boltzmann constant **1.7 THERMAL PHYSICS** Internal energy Absolute temperature Heat transfer Work done by a gas Specific heat capacity **2.6 (ELECTROSTATIC) AND GRAVITATIONAL FIELDS OF FORCE** Features of fields Newton's law of gravitation Field strength and resultant field strength Potential and potential energy **2.7 USING RADIATION TO INVESTIGATE STARS** Emission and absorption spectra Black body radiation Stefan & Wien's laws **2.8 ORBITS AND THE WIDER UNIVERSE**

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OCR Physics A	Eduqas Physics
	Kepler's three laws of planetary motion Derivation of Kepler's third law Evidence for dark matter [Centre of mass for two spherically symmetric objects] Doppler relationship Hubble constant and approximate age of the universe [Critical density of a "flat" universe] **3.4 PHOTONS** Line emission and absorption spectra
Module 6: Particles and medical physics Capacitors Energy stored by a capacitor Charging and discharging capacitors Point and spherical charges Coulomb's law Uniform electric field Electric potential energy Magnetic fields Motion of charged particles Electromagnetism The nuclear atom Fundamental particles Radioactivity Nuclear fission and fusion Using X rays Diagnostic methods in medicine Using ultrasound	**2.3 CAPACITANCE** Parallel plate capacitor Capacitance Electric field Energy stored by a capacitor Capacitors in series and parallel Charging and discharging **2.6 ELECTROSTATIC (AND GRAVITATIONAL) FIELDS OF FORCE** Features of fields Coulomb's law Field strength and resultant field strength Potential and potential energy **3.6 NUCLEAR DECAY** Nuclear decay Types of radiation Half-life, activity and decay constant Exponential decay [Derivation of $\lambda=\ln 2/T_{1/2}$] **3.7 PARTICLES AND NUCLEAR STRUCTURE** Rutherford scattering experiment Coulomb repulsive forces **3.8 NUCLEAR ENERGY** $E=mc^2$ Binding energy Conservation of mass, fission and fusion **3.9 MAGNETIC FIELDS** Force on a current carrying conductor in a magnetic field Force on a moving charge in a magnetic field

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	[Hall voltage] [Field strength for a long straight wire and solenoid] Deflection of ion beams by electric and magnetic fields [Motion of charged particles in linear accelerators, cyclotrons and synchrotrons] **3.10 ELECTROMAGNETIC INDUCTION** Magnetic flux and flux linkage Electromagnetic induction Rotating coil in a perpendicular field **OPTION B MEDICAL PHYSICS** X rays CT scanning Ultrasound Gamma camera Effects of radiation on the body PET scanning [MRI]
Appendix 5f: Mathematical requirements Arithmetic and numerical computation Handling data Algebra Graphs Geometry and trigonometry	Equivalent list in Eduqas as Appendix C

Note:

OCR Physics A does not contain any options, but incorporates Medical physics. Alternating currents are not incorporated in the OCR specification except in term of electromagnetic induction and transformer operation. The 'physics of sport' and 'energy and the environment' may appear as contexts within the OCR assessments, but are not considered in the detail given for Eduqas options.

Assessment

OCR Physics A	Eduqas Physics
AS Paper 1: Breadth in Physics, Modules 1-4 50% of AS Written paper 1hr 30 minutes 70 marks Section A multiple choice questions, 20	**AS Paper 1: Motion, energy and matter** 50% of qualification Written paper 1hr 30 minutes 75 marks A mix of short answer and extended answer structured questions with some set in a

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OCR Physics A	Eduqas Physics
marks. Section B short structured questions, covering problem solving, calculations, practical and theory, 50 marks.	practical context.
AS Paper 2: Depth in Physics, Modules 1-4 50% of AS Written paper 1hr 30 minutes 70 marks Short structured questions and extended response questions, problem solving, calculations, practical and theory.	**AS Paper 2: Electricity and light** 50% of qualification Written paper 1 hr 30 minutes 75 marks A mix of short answer and extended answer structured questions with some set in a practical context.
A Level Paper 1: Modelling Physics, Modules 1, 2, 3 and 5 37% of A level Written paper 2 hours 15 minutes 100 marks Section A multiple choice questions, 15 marks. Section B short structured questions, and extended response questions, problem solving, calculations, practical and theory 85 marks.	**A Level Paper 1: Newtonian Physics** 31.25% of qualification Written paper 2 hours 15 minutes 100 marks Section A: 80 marks short and extended answer questions with some set in a practical context. Section B: 20 marks one comprehension question.
A Level Paper 2: Exploring Physics, Modules 1, 2, 4 and 6 37% of A level Written paper 2 hours 15 minutes 100 marks Section A multiple choice questions, 15 marks. Section B short structured questions and extended response questions, problem solving, calculations, practical and theory 85 marks.	**A Level Paper 2: Electricity and the universe** 31.25% of qualification Written paper 2 hours 100 marks A mix of short and extended answer questions with some set in a practical context.
A Level Paper 3: Unified Physics, Modules 1-6 26% of A level Written paper 1 hour 30 minutes 70 marks Short structured questions and extended response questions, problem solving, calculations, practical and theory.	**A Level Paper 3: Light, Nuclei and Options** 37.5% of qualification Written paper 2 hours 15 minutes 120 marks Section A: 100 marks A mix of short answer and extended answer questions with some set in a practical context. Section B: 20 marks - choice of 1 out of 4

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OCR Physics A	Eduqas Physics
	options: Alternating Currents, Medical Physics, The Physics of Sports, Energy and the Environment.

Want to switch to OCR?

If you're an OCR-approved centre, all you need to do is download the specification and start teaching.

Your exams officer can complete an expression of interest form which enables us to provide appropriate support to them. When you're ready to enter your students, you just need to speak to your exams officer to:

1. Make estimated entries by 10 October so we can send you any early release materials, prepare the question papers and ensure we've got enough examiners.
2. Make final entries by 21 February

If you are not already an OCR-approved centre please refer your exams officer to the centre approval section of our admin guide.

Practical Endorsement Administration (A Level only)

The requirements for the practical endorsement have been set by the Department for Education and Ofqual working with all awarding bodies to ensure a common approach.

Just as when following the Eduqas A Level Physics qualification, your A Level students studying OCR Physics A will need to demonstrate to you, their teacher(s), that they are consistently and routinely competent in each of the skills and techniques defined for A Level Physicists.

You will need to:

- Keep records of carrying out practical activities as well as your assessment of competence of each of your students in each of these skills and techniques. This can be done, if you wish, using our OCR tracker spreadsheet, available in both fixed format and new flexible format, editable version.
- Designate a 'Lead Teacher' who will need to make sure that they have completed the online Lead Teacher training.
- Email us at science@ocr.org.uk to let us know you've started teaching the qualification. This will make sure we have up-to-date information on your centre for planning monitoring visits. When a monitoring visit takes place at your centre for Physics it will be carried out by an OCR-appointed monitor applying the criteria agreed across all awarding organisations. Up-to-date details on the monitoring process are available on the Positive about practical page.

Students need to keep records of their practical work, which can be done in whatever format best suits you and your students, be it a lab book, a loose leaf folder or an electronic record.

Help and guidance are available from our Positive about practical page.

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Next steps

1. Familiarise yourself with the specification, sample assessment materials and teaching resources on the OCR Physics A qualification page of the OCR website.
2. Browse the online delivery guides in Teach Cambridge for teaching ideas and use our scheme of work to prepare for teaching.
3. Ask your exams officer to provide access to our secure resources on Teach Cambridge, or sign-up for a free trial – allows you to access the latest past/practice papers and use our results analysis service, Active Results.
4. Sign up to receive subject updates by email.
5. Sign up to attend a training event or take part in webinars on specific topics running throughout the year and or our Q&A webinar sessions every half term.
6. Attend one of our free teacher network events that are run online every term. These are hosted at the end of the school day in a school or college near you, with teachers sharing best practice and subject advisors on hand to lead discussion and answer questions.
7. Follow us on Twitter (@ocr_science) where you can have discussions with other teachers and OCR Subject Advisors, and where new resources are developed and posted first.

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