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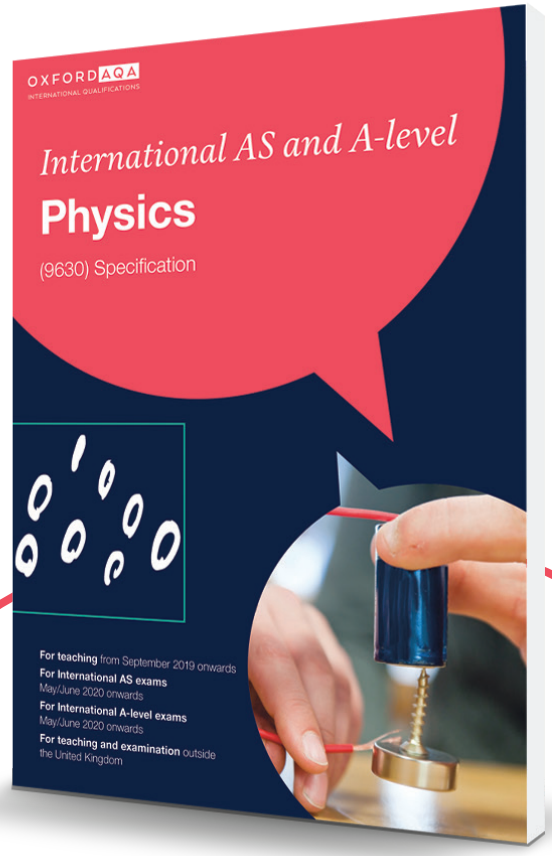
# Switching Guide

## *International AS and A-level*
## Physics
## (9630)




**Switching from Pearson Edexcel or Cambridge International to OxfordAQA International Qualifications**

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# **Switching to OxfordAQA International AS and A-level Physics** (9630)

Designed to prepare students for university study in Physics or Engineering, **OxfordAQA International AS and A-level Physics** covers all topics that universities expect students to have a grounding in, with the inclusion of practical skills in the main exam papers.

**Key features:**

- Our papers are carefully designed to avoid cultural or linguistic bias to help students fully demonstrate their scientific knowledge and understanding.
- Practical components are flexible around local access to equipment and materials, with practical knowledge assessed through the main exam papers.
- Carefully balanced depth and breadth of content that includes topics with contemporary relevance such as renewable energy.

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# Topic by topic comparison

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| **Overall structure** | | |
| The specification is ordered into five units (Two AS and three A2) which are listed in order of assessment within the specification.<br>• Mechanics, materials and atoms (AS)<br>• Electricity, waves and particles (AS)<br>• Fields and their consequences (A2)<br>• Energy and Energy resources (A2)<br>• Physics in practice and multiple choice (A2).<br>Each unit has a number of topics of which five will be assessed at AS level and nine at A2 level. Multiple choice as well as short and long questions are included. Practical will be assessed on the written Unit 5 paper and the required practicals are listed in the appropriate sections of the specification (four AS practicals and a further six A2 practicals). All the exams have the same length and marks as well as weighting for the A-level qualification.<br>For AS level there are two exams, one for unit 1 and one for unit 2. For A2 there are three exams, one for unit 3, one for unit 4 and a practical and analytical skills paper (Unit 5). All five exams make up the A-level. | The syllabus is split into six units, three of which are tested at AS level and three at A2 level.<br>For AS level there are two theory exams and one practical paper. Units 1, 2 and 3 constitute the AS level qualification. For A2 there are two theory exams plus one of two practical theory papers. Six exami papers make up the A level. The papers are not equally weighted and vary in length.<br>• Unit 1 Physics on the go<br>• Unit 2 Physics at work<br>• Unit 3 Exploring physics<br>• Unit 4 Physics on the move<br>• Unit 5 Physics from creation to collapse<br>Either<br>• Unit 6 Experimental physics<br>or<br>• Unit 7 Physics Practical Exam<br>The Edexcel specification is presented in two approaches: concept and context. This document uses the concept approach as the basis for comparison. | The syllabus is split into 25 units, 11 of which are tested at AS level and 14 at A2 level.<br>For AS there are two theory exams, one of which is multiple choice. These two plus a practical-skills paper constitute the AS qualification. For A2 there is one theory exam plus the practical theory paper. All five exams make up the A-level. The papers are not equally weighted and vary in length.<br>• Paper 1 Multiple choice<br>• Paper 2 AS level structured questions<br>• Paper 3 Advanced Practical skills<br>• Paper 4 A-level structured questions<br>• Paper 5 Planning, Analysis and Evaluation |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| **Content** | **Coverage** | **Coverage** |
| 3.1.1 Use of SI units and their prefixes | This is not covered in the Edexcel specification.<br>The section includes the SI units (excluding candela) and prefixes. | This is covered by Cambridge International in sections 1.2.<br>Very similar content in both specifications.<br>Cambridge International includes the use of conventions for labelling graph axes and table columns in this section whereas this content is included in the OxfordAQA Practical handbook. There is guidance on the expectations of Cambridge International examiners in these respects in section 5 Practical Assessment.<br>OxfordAQA include the prefix femto. |
| 3.1.2 Limitation of physical measurements | This is expected for Units 3, 6 and 7 of the Edexcel specification, but is not set out in as much detail.<br>This section includes the language of measurement, absolute, fractional and percentage uncertainties, combining uncertainties, link between uncertainty and graphs, and significant figures. | This is covered in Cambridge International section 1.3.<br>In general a similar level of detail in both.<br>Cambridge International includes techniques of measurement in section 5, which will be reinforced in practical work in both specifications.<br>OxfordAQA include the use of error bars and uncertainties in the gradient and intercept of a straight line graph. |
| 3.1.3 Estimation of physical quantities | The Edexcel specification has no particular section for this although there are examples of estimates given throughout the specification. | This is covered in Cambridge International section 1.1. |
| 3.2.1 Scalars and vectors | Covered in Edexcel specification section 1.3<br>There are some differences in the level of detail between the two specifications. OxfordAQA do not limit calculations to perpendicular forces.<br>Edexcel includes free body force diagrams and centre of gravity (OxfordAQA uses centre of mass). | Covered in Cambridge International section 1.4.<br>Very similar introduction to the topic on both specifications.<br>The OxfordAQA specification has more detail of the requirements in this section and the examples of scalars and vectors are specified, eg force/weight and conditions for two or three coplanar forces acting on a point. |

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|---|---|---|
| 3.2.2 Moments | This is not covered in the Edexcel specification.<br>This topic includes:<br>• Definition of moment<br>• Principle of moments<br>• Moment of couple | Covered in Cambridge International section 4.1 and 4.2.<br>The definitions used are slightly different between Cambridge International and OxfordAQA.<br>OxfordAQA include centre of mass in this section (Cambridge International section 5.1) whereas Cambridge International uses centre of gravity. Torque is covered in 3.13.1 of the OxfordAQA specification. |
| 3.2.3 Motion along a straight line | Covered in Edexcel specification section 1.3<br>Similar coverage of the topic. OxfordAQA includes one extra formula<br>$s = \frac{(u + v)}{2t}$<br>and the acceleration due to gravity *g*.<br>Edexcel includes a comparison between ICT and traditionally collected data for plotting graphs. This is not included in the OxfordAQA specification. | Covered in Cambridge International sections 2.1.<br>Similar coverage of the topic. OxfordAQA lists the required equations. It also includes the distinction between average and instantaneous speeds and velocities. |
| **Required practical 1** | Determination of g by a freefall method. Procedures should include determination of g from a graph (eg from graph of s against $t^2$) | Determination of g by a freefall method. Procedures should include determination of g from a graph (eg from graph of s against $t^2$)<br>This is equivalent to Cambridge International's statement to describe an experiment to determine *g*. |
| 3.2.4 Projectile motion | Covered in Edexcel specification section 1.3<br>More detail of required coverage is given in the OxfordAQA specification. For example, qualitative treatment of lift and drag forces are required, but the difference between static and dynamic friction is not. | Covered in Cambridge International section 2.1.<br>More detail of required coverage is given in the OxfordAQA specification. For example, qualitative treatment of lift and drag forces are required, but the difference between static and dynamic friction is not. |

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|---|---|---|
| 3.2.5 Newton's laws of motion | Covered in Edexcel specification section 1.3.<br>More detail of required coverage is given in the OxfordAQA specification. For example, qualitative treatment of lift and drag forces are required, but the difference between static and dynamic friction is not. | Covered in Cambridge International section 3.1.<br>There is similar content covering Newton's laws of motion. The OxfordAQA specification is clear that $F=ma$ will be used only in situations where mass is constant, and does not require the discussion of inertial mass. |
| 3.2.6 Momentum | Covered in Edexcel specification section 3.3, which is an A2 section.<br>Similar coverage of the main aspects of this topic.<br>OxfordAQA include impulse and the relationship between impact forces and contact times.<br>OxfordAQA does not include the momentum of (non-relativistic) particles. | Covered mainly in Cambridge International sections 3.1 and 3.3.<br>The content of 3.1 is similar on both specifications.<br>OxfordAQA include the relationship between impact forces and contact times. Cambridge International considers interactions between bodies in both one and two dimensions, whereas OxfordAQA limits problems to one dimension.<br>OxfordAQA also requires the significance of the area under a force–time graph. |
| 3.2.7 Work, energy and power | Covered in Edexcel specification section 1.3.<br>Edexcel only includes $\triangle W=F\triangle s$.<br>OxfordAQA also includes the significance of area under force–extension graph and efficiency. | Covered in Cambridge International section 5.1.<br>A slightly different coverage of the topic. Cambridge International includes derivations of equations which OxfordAQA does not.<br>OxfordAQA includes forces that are not in the same direction as the movement and the significance of the area under a force–displacement graph.<br>OxfordAQA also includes the equation for efficiency and defines power as the rate of doing work. |
| 3.2.8 Conservation of energy | Covered in Edexcel specification section 1.3.<br>The OxfordAQA includes elastic potential energy and work done against resistive forces. | Covered in Cambridge International section 5.1 and 5.2.<br>The OxfordAQA specification is more explicit in the coverage of this part of the specification. |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| 3.2.9 Bulk properties of solids | Covered in Edexcel specification section 1.4.<br>The Edexcel international specification has a broader treatment of this topic. The following are not included in the OxfordAQA specification:<br>• The terms laminar/streamline/turbulent flow, viscous drag<br>• Viscosity and Stokes' Law<br>• Terms such as brittle, ductile etc.<br>There are a few differences in the symbols used in the formulas in this section (for example Edexcel international use x for extension; OxfordAQA use *L*)<br>OxfordAQA require the interpretation of stress-strain curves. | Covered in Cambridge International sections 4.3, 6.1 and 6.2.<br>Similar content although the OxfordAQA specification has equations included and gives detail of a qualitative as well as a quantitative approach.<br>Both specifications include force–extension graphs. Stress–strain graphs are not included in the Cambridge International specification. |
| 3.2.10 The Young modulus | Covered in Edexcel specification section 1.4.<br>OxfordAQA require the use of stress–strain graphs to determine the Young modulus. | Covered in Cambridge International section 6.1.<br>OxfordAQA require the use of stress–strain graphs to determine the Young modulus. |
| **Required practical 2** | Investigation of load–extension graph for a wire and determination of the Young modulus for the material of the wire. | Investigation of load–extension graph for a wire and determination of the Young modulus for the material of the wire.<br>Equivalent to the Cambridge International requirement to describe an experiment to determine the Young modulus of a metal in the form of a wire. |

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|---|---|---|
| 3.3.1 Constituents of the atom | Covered in Edexcel specification section 3.5.<br>Edexcel has a greater emphasis on particle physics. Areas that are included in the Edexcel international specification that are not included in OxfordAQA include:<br>• Thermionic emission<br>• Particle accelerators and detectors<br>• $r=p/BQ$<br>• Conservation laws<br>• The units MeV $c^{-2}$ and GeV $c^{-2}$<br>• Relativistic effects<br>• The standard quark–lepton model (neutrinos are included in OxfordAQA)<br>• Nuclear equations | Covered in Cambridge International section 11.1.<br>Covered to a similar level, although OxfordAQA require an appreciation of the history of knowledge of atomic structure, and the Cambridge International specification specifically discusses isotopes.<br>The Cambridge International specification includes quarks, leptons and the weak interaction which are not included in OxfordAQA. |
| 3.3.2 Elementary particles | | There is a partial coverage of these topics in Cambridge International section 11.1. Knowledge of, and calculations including, rest energies are not included in Cambridge International. |
| 3.3.3 Radioactivity | Some content included in Edexcel specification section 4.4.<br>The evidence for the existence of the neutrino from beta decay is included in the OxfordAQA specification.<br>The OxfordAQA specification includes coverage of the following aspects which are not included in the Edexcel specification.<br>• Half-life and half-life calculations<br>• Excited states<br>• Gamma radiation emission and the inverse square law<br>• Absorption of radiation<br>• Hazards and safe handling<br>• Background radiation | Some content included in Cambridge International section 11.1.<br>The evidence for the existence of the neutrino from beta decay is included in the OxfordAQA specification.<br>The OxfordAQA specification includes coverage of the following aspects which are either not included in the Cambridge International specification, or included only in the A2 units:<br>• Half-life and half-life calculations<br>• Excited states<br>• Gamma radiation emission and the inverse square law<br>• Absorption of radiation<br>• Hazards and safe handling<br>• Background radiation |

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|---|---|---|
| 3.4.1 Basics of electricity | Covered in section 2.4 of the Edexcel specification.<br>The level of coverage is similar.<br>Topics that are not included in the OxfordAQA specification that are included in Edexcel:<br>• *I=Anvq*<br>• Qualitative link between resistance, temperature and lattice vibration.<br>OxfordAQA includes superconductivity, which is not included in the Edexcel specification.<br>There are a few slight differences in symbols used in formulas between the two specifications. | The Cambridge International specification is set out in a different order from the OxfordAQA specification. The relevant sections are 9.1 – 9.3 and 10.1 – 10.3.<br>The level of coverage is similar. OxfordAQA does not require the recall of equations and has no "define" statements.<br>Knowledge and use of *I=Anvq* is not included in the OxfordAQA specification but is included in Cambridge International:<br>Superconductivity is not included in the Cambridge International specification.<br>Kirchhoff's laws are explicitly listed in the Cambridge International specification by number, whereas their application (conservation of charge and energy) is required by OxfordAQA. Derivations of equations are not required by OxfordAQA. |
| 3.4.2 Current-voltage characteristics | | |
| 3.4.3 Resistivity | | |
| 3.4.4 Circuits | | |
| 3.4.5 Potential divider | | |
| 3.4.6 Electromotive force and internal resistance | | |
| **Required practical 3** | Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of a cell or battery with current. | Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of a cell or battery with current.<br>There is no requirement for work on practical electricity in the Cambridge International specification. |

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|---|---|---|
| 3.5.1 Oscillating systems<br>3.5.2 Forced vibrations and resonance | These two sections are covered, to some extent, in the Edexcel specification section 2.3 (AS) and section 4.5 which is A2 content.<br>The OxfordAQA specification includes the formulas for mass-spring systems and simple pendulums, which are not included in the Edexcel specification.<br>OxfordAQA specifies phase difference in angle (radian or degree) or fractions of a cycle.<br>The link between damping and plastic deformation, required in the Edexcel specification, is not required for OxfordAQA. | These two sections are covered, to some extent, in the Cambridge International sections 17.1. – 17.3 which are A2 content.<br>The OxfordAQA specification includes the equations for mass–spring systems and simple pendulums, which are not included in the Cambridge International specification.<br>OxfordAQA specifies phase difference in angle (radian or degree) or fractions of a cycle.<br>The equations for simple harmonic motion from section 17.1 are A2 content (see 3.6.4). |
| **Required practical 4** | Investigation into simple harmonic systems using a mass-spring system and a simple pendulum. | Investigation into simple harmonic systems using a mass–spring system and a simple pendulum.<br>There is no requirement for a similar experiment in the Cambridge International specification. |
| 3.5.3 Progressive waves | Covered in Edexcel specification section 2.3.<br>Edexcel specification uses the *v* for velocity in $v=f\lambda$; OxfordAQA uses *c*. | Covered in Cambridge International section 7.1.<br>Cambridge International uses v for velocity in $v=f\lambda$; OxfordAQA uses *c*. Cambridge International expects a deduction of this equation which OxfordAQA does not.<br>Cambridge International specifies waves in a spring and in a ripple tank whereas OxfordAQA includes electromagnetic waves.<br>Cambridge International includes the relationship between intensity and amplitude which is not required for OxfordAQA. |
| 3.5.4 Longitudinal and transverse waves | Covered in Edexcel specification section 2.3.<br>The Edexcel specification includes the concept of wave fronts, which OxfordAQA does not. It also includes slightly more detail regarding polarisation. | Covered in Cambridge International section 7.2, 7.4 and 7.5.<br>OxfordAQA requires the understanding of a number of different examples, including electromagnetic waves and ultrasound. |

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|---|---|---|
| 3.5.5 Principle of superstition of waves and formation of stationary waves | Covered in Edexcel specification section 2.3.<br>OxfordAQA goes into more detail regarding harmonics, including the formula for the first harmonic of a string. The specification also requires understanding of experiments that investigate stationary waves on springs. | Covered in Cambridge International section 8.1.<br>The coverage of this section is similar in both specifications.<br>OxfordAQA goes into more detail regarding harmonics, including the equation for the first harmonic of a string. The specification also requires understanding of experiments that investigate stationary waves on springs. |
| 3.5.6 Interference | This section is not covered in the Edexcel specification.<br>It includes:<br>• Path difference and coherence (as section 2.3 in Edexcel specification)<br>• Young double-slit experiment<br>• Fringe spacing<br>• White light interference patterns<br>• Safety issues associated with lasers. | Covered in Cambridge International 8.3 and 8.4.<br>Both specifications cover this to a similar depth. The symbols used in the double-slit fringe spacing equation are differ between the two specifications.<br>OxfordAQA expects students to show awareness of safety whilst using lasers.<br>There is a slight difference between the examples of interference included (Cambridge International includes water ripples, light and microwaves, OxfordAQA includes sound and electromagnetic waves). |
| **Required practical 5** | Investigation of interference effects to include Young double-slit experiment and interference by a diffraction grating. | Investigation of interference effects to include Young's slit experiment and interference by a diffraction grating.<br>There is no requirement for experimental treatment of interference in the Cambridge International specification. |
| 3.5.7 Diffraction | Covered in Edexcel specification section 2.3.<br>The OxfordAQA has a deeper coverage of this topic. It includes diffraction gratings and the derivation of $d \sin \theta = n\lambda$ | Covered in Cambridge International section 8.2.<br>Both specifications have a similar depth of coverage. |

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|---|---|---|
| 3.5.8 Refraction at a plane surface | Covered in Edexcel specification section 2.3.<br>The treatment is to a similar level in both specifications, but the symbols are slightly different in the equations (eg $\theta_i$ in OxfordAQA, $i$ in Edexcel).<br>OxfordAQA includes discussion of fibre optics in this section; Edexcel specifies 'discussion of situations that require accurate determination of refractive index'. | This section is not covered in the Cambridge International specification.<br>It includes refractive index, Snell's law, total internal reflection and optical fibres. |
| 3.5.9 Collision of electrons with atoms<br>3.5.10 Photoelectric effect | These sections are presented in a slightly different order in the Edexcel specification in sections 2.5.<br>They are covered to a similar level of detail in both specifications.<br>The symbols in formulas are slightly different in the two specifications. | These sections are presented in a slightly different order in the Cambridge International specification in sections 22.1 – 22.4 (A2).<br>Although these sections are A2 units in Cambridge International and AS in OxfordAQA, they are covered to a similar level of detail.<br>Cambridge International requires students to distinguish between emission and absorption line spectra.<br>The Cambridge International specification includes more detail on band theory (which is not included in OxfordAQA) and includes more detail in its section on X-rays including exponential absorption equation for X-rays, CT scanning and imaging. |
| 3.5.11 Wave particle duality | The concept of wave particle duality is covered in Edexcel international specification section 2.3.<br>de Broglie's equation is covered in Edexcel specification section 3.5. | |
| 3.6.1 Circular motion (A-level only) | | Covered in Cambridge International sections 12.1 and 12.2.<br>The coverage of these sections is similar in both specifications. OxfordAQA does not require the recall of equations and includes $\omega = 2\pi f$ whereas Cambridge International includes $\omega = \frac{2\pi}{T}$ . |

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|---|---|---|
| 3.6.2 Simple harmonic motion (A-level only) | | Covered in Cambridge International section 17.1 and 17.2.<br>The OxfordAQA specification uses the cosine variant of the displacement formula; Cambridge International uses the sine variation.<br>OxfordAQA requires understanding of the gradient of displacement–time and velocity–time graphs. It also requires use of maximum speed and acceleration equations and the derivation of equations for mass–spring system and simple pendulum.<br>The equation for the total energy of an oscillator is also required. |
| 3.6.3 Circular motion (A-level only) | Covered in Edexcel specification sections 3.3 and 4.5.<br>The coverage of these sections is similar in both specifications, although these areas are brought together in the OxfordAQA specification. OxfordAQA does not require the derivation of these formulas. | |
| 3.6.4 Simple harmonic motion (A-level only) | Covered in Edexcel specification section 4.5.<br>The OxfordAQA specification takes a more mathematical approach to this topic. It includes some formulas not included in the Edexcel specification.<br>In this section, the derivation of the formulas for mass–spring and simple pendulum (introduced in 3.5.1) are required. | |
| 3.7.1 Newton's gravitational law (A-level only) | Covered in Edexcel specification section 4.6. | Covered in Cambridge International section 13.2.<br>Cambridge International includes the fact that uniform spheres can be treated as point masses. |

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|---|---|---|
| 3.7.2 Gravitational field strength (A-level only) | Covered in Edexcel section 4.6.<br>The content of the two specifications is essentially the same. There are a few subtle differences. For example, Edexcel uses the negative convention for gravitational field strength, whereas OxfordAQA does not.<br>OxfordAQA requires the use of field lines to represent gravitational fields.<br>Edexcel requires derivation of formulas; this is not required for OxfordAQA. | Covered in Cambridge International section 13.1 and 13.3.<br>The content of the two specifications is essentially the same. There are a few subtle differences in wording. For example, OxfordAQA refers to 'magnitude of radial fields' which Cambridge International does not.<br>Cambridge International requires recall and/or derivation of equations; this is not required for OxfordAQA. |
| 3.7.3 Gravitational potential (A-level only) | This section is not covered in the Edexcel international specification.<br>It includes:<br>• Work done in moving a mass<br>• Gravitational potential in a radial field<br>• Equipotential surfaces<br>• Graphical representations of g and *V* with *r*<br>• Formula linking g and *V* with *r* | Covered in Cambridge International section 13.4.<br>There is a slight difference in symbols used. Cambridge International uses Ø for potential; OxfordAQA uses *V*.<br>OxfordAQA include more detail in this section, including the equation for the work done in moving a mass, the concept of zero potential at infinity, equipotential surfaces, graphical representations and the relationship between gravitational potential and *g*. |
| 3.7.4 Orbits of planets and satellites (A-level only) | This section is not covered in the Edexcel specification.<br>It includes:<br>• Links between period, speed and radius<br>• Energy considerations<br>• Geosynchronous orbits. | Covered in Cambridge International section 13.2.<br>Cambridge International does not discuss energy considerations for orbiting satellites. |

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| 3.8.1 Coulomb's law (A-level only) | Covered in Edexcel specification section 3.4.<br>There are several areas not covered in the Edexcel specification that are required by OxfordAQA.<br>These include:<br>• Further detail on the assumptions that can be used in Coulomb's law calculations<br>• Comparison of magnitude of gravitational and electrostatic forces between subatomic particles<br>• Work done in moving a charge between plates<br>• Trajectory of a moving charge in an electric field<br>• Magnitude of *E* in a radial field. | These topics are presented in a slightly different order in the Cambridge International specification in sections 18.1 – 18.5.<br>The content and depth of treatment of these topics in the two specifications is very similar.<br>Areas not covered in Cambridge International which OxfordAQA includes are: the work done on a moving charge; graphical representations of *E* and *V* with r; the relationship between *E* and *V*; finding $\triangle V$ from a graph of *E* against *r*; comparison of the magnitude of gravitational and electrostatic forces between subatomic particles. |
| 3.8.2 Electric field strength (A-level only) | | |
| 3.8.3 Electric potential (A-level only) | This section is not covered in the Edexcel specification.<br>It includes:<br>• The definition of absolute electric potential<br>• Work done in moving a charge in a field<br>• Equipotential surfaces<br>• Magnitude of *V* in a radial field<br>• Graphical representations of fields<br>• Relationship between *E* and *V*<br>• $\triangle V$ from the area under an *E*–r graph | |

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| 3.8.4 Capacitors (A-level only) | Covered in Edexcel specification section 3.4.<br>The two specifications have a similar treatment of this topic.<br>OxfordAQA includes the formula linking area and plate separation for a parallel-plate capacitor and discusses dielectric action.<br>Energy stored in a capacitor is labelled as *W* in Edexcel and *E* for OxfordAQA, who also give two extra variants of the formula. | Covered in Cambridge International section 19.1 and 19.2.<br>Similar treatment, although OxfordAQA does not include combining capacitors in series and parallel.<br>OxfordAQA includes the equation linking area and plate separation for a parallel plate capacitor and discusses dielectric action.<br>Energy stored in a capacitor is labelled as *W* in Cambridge International and E for the OxfordAQA specification, which also give an extra variant of the equation. |
| 3.9.1 Capacitor charge and discharge (A-level only) | Covered in Edexcel specification section 3.4.<br>OxfordAQA also requires students to use the "time to halve" formula and to interpret the gradient and area of graphs. | Covered in Cambridge International section 19.3.<br>Cambridge International does not include time to halve charge as ln 2*RC* or capacitor charging. |
| **Required practical 6** | Investigation of the charge and discharge of capacitors. Analysis techniques should include log–linear plotting leading to a determination of the time constant *RC*. | Investigation of the charge and discharge of capacitors. Analysis techniques should include a log–linear plot that leads to a determination of the time constant *RC*.<br>There is no equivalent of this experiment in the Cambridge International specification. |
| 3.9.2 Exponential changes in radioactivity (A-level only) | Covered in Edexcel specification section 4.4.<br>Very similar treatment, although there are small differences, such the requirement to use molar mass or the Avogadro constant. OxfordAQA require the determination of half-life from graphical decay data including decay curves and log graphs.<br>The Edexcel specification requires an awareness of the origin of background radiation, of penetrating power and of ethical issues, none of which are required by OxfordAQA. | Covered in Cambridge International section 23.2.<br>Very similar treatment, although there are a small number of differences, such as *ln 2* being referred to as 0.693 in the Cambridge International specification.<br>OxfordAQA require the determination of half-life from graphical decay data including decay curves and log graphs. |

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| 3.10.1 Magnetic flux density (A-level only) | Covered in Edexcel specification section 3.4.<br>Similar coverage, although Edexcel include non-perpendicular current and magnetic fields which OxfordAQA does not. | Covered in Cambridge International sections 20.1 and 20.2.<br>Similar coverage, although Cambridge International includes non-perpendicular current and magnetic fields which OxfordAQA does not. |
| 3.10.2 Moving charges in a magnetic field (A-level only) | Covered in Edexcel sections 3.4.<br>Similar coverage, although Edexcel include non-perpendicular velocity and magnetic fields which OxfordAQA does not. | Covered in Cambridge International section 20.3.<br>Similar coverage, although Cambridge International include non-perpendicular velocity and magnetic fields which OxfordAQA does not.<br>Cambridge International includes discussion of the Hall voltage, velocity selection and determination of $v$ and $\frac{e}{m}$ for electrons, which are not included in OxfordAQA. |
| 3.10.3 Magnetic flux and flux linkage (A-level only)<br>3.10.4 Electromagnetic induction (A-level only) | Covered in Edexcel specification section 3.4<br>The OxfordAQA specification has a slightly d.eeper treatment of this area. It includes the relationships $N\Phi = BAN\cos\theta$ and the link between induced emf, rate of flux linkage and the angular speed of a coil in a magnetic field. | Covered in Cambridge International section 20.5.<br>The OxfordAQA specification has a slightly deeper treatment of this area. It includes the relationships $N\Phi = BAN\cos\theta$ and the link between induced emf, rate of flux linkage and the angular speed of a coil in a magnetic field. |

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| 3.10.5 Alternating currents (A-level only) | This section is not covered in the Edexcel specification.<br>It includes:<br>• Peak-to-peak voltages and currents for sinusoidal wave forms<br>• Use of oscilloscopes | Covered in Cambridge International section 21.1.<br>Slight variations of treatment between the two specifications, although broadly the same content. Cambridge International include the equation for sinusoidal alternating currents or voltages; OxfordAQA includes the root mean square (rms) value of voltage and some applications.<br>OxfordAQA also includes the use of an oscilloscope to measure time intervals and frequencies and to display ac waveforms (7.1 in Cambridge International). |
| 3.10.6 The operation of a transformer (A-level only) | This section is not covered in the Edexcel specification.<br>It includes:<br>• The transformer equation<br>• Efficiency equation and causes<br>• Transmission of electrical power | This is not covered in the Cambridge International specification. |
| **Required practical 7** | Investigation of the efficiency of a transformer.<br>This is not covered in the Edexcel specification. | Investigation of the efficiency of a transformer.<br>This is not covered in the Cambridge International specification. |
| 3.11.1 Energy transfer by heating and doing work (A-level only) | Specific heat capacity is covered in Edexcel specification section 4.3.<br>Most of the rest of this section is not included in the Edexcel specification.<br>It includes:<br>• Internal energy<br>• First law of thermodynamics<br>• Specific latent heat | This is covered in Cambridge International sections 14.1 – 14.3 and 16.1 and 16.2. |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| **Required practical 8** | Determination of specific heat capacity by an electrical method. | Determination of specific heat capacity by an electrical method. |
| 3.11.2 Energy transfer by conduction and radiation (A-level only) | This is not covered in the Edexcel specification.<br>It includes some formulas that students need to be able to use. | This is not covered in the Cambridge International specification.<br>It includes several equations that students need to be able to use. |
| 3.11.3 Ideal gases (A-level only) | This is covered in Edexcel international specification section 4.3.<br>Most of the content is common to both specifications, although OxfordAQA also includes $PV = nRT$ and the work done on a gas undergoing a change in pressure or volume. | These sections are presented in a slightly different order in Cambridge International section 15.1 and 15.2. |
| **Required practical 9** | Investigation of Boyle's law (constant temperature) and Charles's law (constant pressure). | Investigation of Boyle's law (constant temperature) and Charles's law (constant pressure). |
| 3.11.4 Kinetic theory of gases (A-level only) | This is not covered in the Edexcel specification.<br>OxfordAQA includes a more detailed discussion of the mathematical background to the kinetic theory of gases. | Most of the content is common to both specifications (section 15.3 in Cambridge International), although there are subtle differences in symbols used, in particular $c_{rms}$ or $\langle c \rangle$.<br>Cambridge International requires the recall of equations; OxfordAQA does not. |
| 3.12.1 Radius of the nucleus (A-level only) | This section does not appear in the Edexcel specification.<br>The OxfordAQA specification includes:<br>• The formula for radius of a nucleus, based on experimental data<br>• Coulomb formula estimate of closest approach<br>• Calculation of nuclear density<br>• Graph of intensity against angle for electron diffraction by a nucleus | This section does not appear in the Cambridge International specification. The OxfordAQA specification includes:<br>• The equations for the radius of a nucleus, based on experimental data<br>• Coulomb equation for closest approach estimate<br>• Calculation of nuclear density<br>• Graph of intensity against angle for electron diffraction by a nucleus |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| 3.12.2 Mass and energy (A-level only) | Covered in Edexcel specification sections 3.4 and 4.6.<br>The OxfordAQA specification covers the same content as the Edexcel specification. | Covered in Cambridge International section 23.1.<br>The OxfordAQA specification covers the same content as the Cambridge International one, but adds extra detail such as the atomic mass unit. |
| 3.12.3 Induced fission (A-level only) | Much of these topics is unique to OxfordAQA, although there is some coverage in in Edexcel specification section 4.5.<br>Topics in OxfordAQA include:<br>• Thermal neutrons, chain reactions, critical mass<br>• Functions of moderator, control rods and coolant in reactors<br>• Factors affecting the choice of materials for each<br>• Fuel used<br>• Handling<br>• Storage<br>• Appreciation of balance between risk and benefits<br>• Knowledge of suitable nuclei<br>• Energy considerations<br>• Solar fusion cycle<br>• Problems that need to be overcome | Much of this topic is unique to OxfordAQA.<br>Topics in OxfordAQA include:<br>• Thermal neutrons, chain reactions, critical mass<br>• Functions of moderating material, control rods, and coolant in reactors<br>• Factors affecting the choice of materials for each function |
| 3.12.4 Safety aspects nuclear reactors (A-level only) | | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Fuels used<br>• Handling<br>• Storage<br>• Appreciation of balance between risk and benefits |
| 3.12.5 Nuclear fusion (A-level only) | | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Knowledge of suitable nuclei<br>• Energy considerations<br>• Solar fusion cycle<br>• Problems that need to be overcome |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| 3.13.1 Rotational motion (A-level only) | This section is not covered in the Edexcel specification.<br>Topics in OxfordAQA include:<br>• Moment of inertia<br>• Angular acceleration<br>• Torque<br>• Conservation of angular momentum<br>• Rotational kinetic energy<br>• Work and power | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Moment of inertia<br>• Angular acceleration<br>• Torque (in a dynamic context)<br>• Conservation of angular momentum<br>• Rotational kinetic energy<br>• Work and power |
| 3.13.2 Wind energy (A-level only) | This section is not covered in the Edexcel specification.<br>Topics in OxfordAQA include:<br>• Maximum power available from a wind turbine<br>• Wind shadows<br>• Environmental factors | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Maximum power available from a wind turbine<br>• Wind shadows<br>• Environmental factors |
| 3.13.3 Solar energy (A-level only) | There is some overlap with Edexcel specification section 4.6, but much of this section is unique to OxfordAQA.<br>Topics in OxfordAQA include:<br>• Intensity of solar energy at Earth's surface<br>• Inverse-square law for intensity<br>• *V-I* characteristics of a solar cell<br>• Arrangement of cells in solar arrays | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Intensity of solar energy at Earth's surface<br>• Inverse-square law for intensity<br>• *V-I* characteristics of a solar cell<br>• Arrangement of cells in solar arrays |

| OxfordAQA specification (9630) | Pearson Edexcel International specification | Cambridge International specification |
|---|---|---|
| **Required practical 10** | Investigation of the inverse-square law for light using an LDR and a point source. | Investigation of the inverse-square law for light using an LDR and a point source. |
| 3.13.4 Hydroelectric power and pumped storage (A-level only) | This section is not covered in the Edexcel specification.<br>Topics in OxfordAQA include:<br>• Components of a hydroelectric power station<br>• Energy transfer<br>• Maximum power available from a wind turbine<br>• Types of power stations | This section is not covered in the Cambridge International specification.<br>Topics in OxfordAQA include:<br>• Components of a hydroelectric power station<br>• Energy transfer<br>• Maximum power available from a wind turbine<br>• Types of power stations |

**Note: recall of formulas and derivations.**

OxfordAQA does not require the recall of formulas. Recall is a low-level skill, and assessing it means that there are fewer marks available for more challenging application questions. In a similar fashion, very few derivations are required in the OxfordAQA specification as they tend to produce memorised responses. Teachers may wish to include derivations in their teaching in order to allow students to understand formulas in more detail.

# Topics in the Edexcel International specification that OxfordAQA does not cover

| Section of the Pearson Edexcel International specification | Topic |
|---|---|
| 2.3 sections 46 – 49 | Pulse-echo scanning including Doppler effect. These are not included in the OxfordAQA specification. |
| 4.6 sections 130 – 135 | Cosmology, including parallax, the Hertzprung-Russell diagram, black body radiation, Wien's law, red shift and Hubble's law. |

# Topics in the Cambridge International specification that OxfordAQA does not cover

| Section of the Cambridge International specification | Topic |
|---|---|
| 5.4 Density and pressure | Pressure in liquids is not covered in the OxfordAQA specification. |
| 7.3 Doppler effect for sound waves | This is not covered in the OxfordAQA specification. |
| 14 Temperature (A-level only) | Elements of this topic are covered throughout the OxfordAQA specification. |
| 20.4 Magnetic fields due to currents (A-level only) | The recall elements of this section are not included in the OxfordAQA specification, although the concepts and/or contexts could be used in application questions. |
| 21.2 Rectification and smoothing (A-level only) | This is not covered in the OxfordAQA specification. |
| 24.1 Production and use of ultrasound in diagnosis (A-level only) | This is not covered in the OxfordAQA specification. |
| 24.2 Production and use of X-rays (A-level only) | There is considerably more detail in this section in the Cambridge International specification. |
| 25 Astronomy and cosmology (A-level only) | This is not covered in the OxfordAQA specification. |

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OxfordAQA International Qualifications
Great Clarendon Street
Oxford OX2 6DP
United Kingdom