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OCR GCSE (9-1) PHYSICS B J259

TWENTY FIRST CENTURY SCIENCE | FOUNDATION + HIGHER

MASTER SPECIFICATION & PRACTICAL REFERENCE

Full J259 narrative course map, Foundation/Higher distinctions, Ideas about Science and PAGs

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Qualification architecture

OCR route used in this pack

OCR offers two separate GCSE Physics qualifications: Physics A (Gateway Science) J249 and Physics B (Twenty First Century Science) J259. This publication is specifically J259. Physics B is narrative/context-led and must not be revised as if it were Gateway J249.

Tier	Components	Marks	Duration	Assessment style
Foundation	J259/01 Breadth + J259/02 Depth	90 + 90	1 h 45 each	Both papers may assess the whole specification. Breadth uses short/structured questions; Depth includes deeper application and at least two 6-mark Level of Response questions.
Higher	J259/03 Breadth + J259/04 Depth	90 + 90	1 h 45 each	Same whole-specification structure at Higher demand; bold specification statements are Higher-only.

Foundation awards grades 1-5. Higher awards grades 4-9 with a grade-3 safety-net outcome for candidates just below grade 4. Assessment objectives are 40% AO1, 40% AO2 and 20% AO3. OCR states that quantitative skills account for at least 30% of Physics and practical skills are assessed in no less than 15% of questions.

Complete chapter map

P1 - Radiation and waves

Assessment	Official structure
Both Breadth and Depth	P1.1 risks/benefits of radiations; P1.2 climate change evidence; P1.3 wave behaviour; P1.4 light/sound at materials (separate science only)

What the course requires: EM radiation, risks/benefits, climate evidence, wave model, wavelength/frequency/speed, reflection/refraction; separate Physics adds lenses, colour and sound transmission in materials.

High-risk diagnostic areas: Radiation vs radioactivity; wave-feature labels; energy/force confusion; causal claims from climate evidence; refraction explanations.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P2 - Sustainable energy

Assessment	Official structure
Both Breadth and Depth	P2.1 energy use; P2.2 electricity generation

What the course requires: Energy transfers, power, efficiency, national/global energy demand, generation methods, renewable/non-renewable comparison and sustainability decisions.

High-risk diagnostic areas: Power vs energy; kW/kWh conversion; efficiency denominator; unsupported “best source” claims; confusing environmental impact with reliability.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P3 - Electric circuits

Assessment	Official structure
Both Breadth and Depth	P3.1 electric charge (separate science only); P3.2 current; P3.3 series/parallel; P3.4 rate of energy transfer; P3.5 magnetic fields; P3.6 motors; P3.7 generators (separate science only)

What the course requires: Charge/current/p.d./resistance, series/parallel rules, electrical power/energy, magnetism, motor effect; separate Physics adds static charge/electric fields and generator/transformer detail.

High-risk diagnostic areas: Current being used up; meter placement; current/charge units; electron vs conventional current; transformer/induction explanations; circuit variables.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P4 - Explaining motion

Assessment	Official structure
Both Breadth and Depth	P4.1 forces; P4.2 describing motion; P4.3 forces and motion; P4.4 motion and energy transfers; P4.5 cosmology/Big Bang context in separate science

What the course requires: Scalars/vectors, weight, speed/velocity/acceleration, motion graphs, Newton laws, momentum, stopping, moments, work, KE/GPE, power; separate Physics links to orbital/cosmological models.

High-risk diagnostic areas: Distance vs displacement; graph gradient/area; zero resultant force; Newton III; signs in momentum; thinking vs braking distance; work/energy language.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P5 - Radioactive materials

Assessment	Official structure
Both Breadth and Depth	P5.1 radioactivity; P5.2 safe use; P5.3 nuclear energy (separate science only)

What the course requires: Atomic/nuclear model, alpha/beta/gamma, ionisation/penetration, half-life, background, risk and safe handling; separate Physics adds fission/fusion and nuclear energy.

High-risk diagnostic areas: Random decay; half-life; irradiation vs contamination; activity/count rate; risk vs hazard; fission vs fusion; evidence for nuclear model.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P6 - Matter - models and explanations

Assessment	Official structure
Both Breadth and Depth	P6.1 energy transforms matter; P6.2 particle model and heating; P6.3 materials under stress; P6.4 pressure in fluids (separate science only); P6.5 Big Bang/model context (separate science only)

What the course requires: Density, SHC/latent heat, particle model, gas behaviour, springs/elasticity; separate Physics adds pressure equations, fluid pressure and cosmological model applications.

High-risk diagnostic areas: Density volume units; SHC vs latent heat; particle arrangement vs motion; extension vs length; proportionality; gas assumptions; pressure units.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P7 - Ideas about Science

Assessment	Official structure
Assessed in any context	IaS1 investigation design; IaS2 data/conclusions; IaS3 scientific explanations; IaS4 science/technology/society

What the course requires: Variables, uncertainty, repeatability/reproducibility, correlation vs causation, peer review, models, risk/benefit, ethics, communication and evidence-based decision making.

High-risk diagnostic areas: Vague evaluations; “correlation proves cause”; unsupported conclusions; confusing accuracy/precision; weak risk-benefit discussion; model limitations omitted.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

P8 - Practical Skills

Assessment	Official structure
Assessed in written papers	Eight compulsory PAGs and all listed apparatus/techniques

What the course requires: Planning, apparatus use, measurement, graphs, uncertainties, repeat strategy, anomalies, processing and improvement across PAG1-PAG8.

High-risk diagnostic areas: Methods without measurements/controls; wrong meter connection; weak graph processing; repeat-and-average as a universal fix; unsafe/irrelevant improvements.

Secure-performance test: Explain the model or evidence chain precisely, complete at least one calculation with correct units where relevant, interpret a graph/data source, and apply the idea in an unfamiliar Twenty First Century context.

Tier/scope check: Bold specification statements are Higher-only. OCR explicitly marks several sections as separate-science-only; those are included because J259 is the separate Physics qualification.

Breadth vs Depth - how revision must differ

Feature	Breadth paper	Depth paper
Question style	Short-answer, structured, calculations and practical questions from across P1-P7.	Short-answer plus deeper application; at least two 6-mark Level of Response questions.
AO weighting within whole qualification contribution	AO1 24%, AO2 18%, AO3 8%.	AO1 16%, AO2 22%, AO3 12%.
Best revision emphasis	Fast recall, accurate equations, concise explanations, practical familiarity.	Linking ideas, unfamiliar applications, analysing evidence, improving procedures, extended scientific explanations.

- Breadth practice should include rapid mixed-topic retrieval rather than isolated topic blocks.
- Depth practice should include 6-mark explanations, practical evaluation, multi-step calculations and evidence/model questions.
- Because both papers assess the whole specification, no chapter can be assigned to only one paper.

Ideas about Science audit

IaS1 - investigations

Variables, range, repeats, apparatus resolution, uncertainty, accuracy, precision, repeatability, reproducibility, random/systematic error and method improvement.

IaS2 - data and conclusions

Tables/graphs, outliers, patterns, uncertainty, interpolation/extrapolation, conclusions and the strength of evidence.

IaS3 - developing explanations

Correlation vs causation, peer review, scientific theories changing with evidence, representational/mathematical models and limitations.

IaS4 - science and society

Risk/benefit, perceived vs calculated risk, ethical issues, sustainability, stakeholder perspectives and communication.

P8 practical skills - eight compulsory PAGs

OCR practical requirement

Learners must complete at least eight practical activities covering PAG1-PAG8 and all specified apparatus/techniques. Centres may use OCR suggested activities or suitable alternatives. The practicals prepare learners for written assessment; there is no separate practical exam grade.

PAG1 - Materials

Typical focus: Determine densities of solids/liquids

Method and analysis control: Measure mass and appropriate dimensions/volume; use displacement for irregular solids; calculate density and consider measurement resolution.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG2 - Forces

Typical focus: Investigate force-extension behaviour

Method and analysis control: Measure original and loaded lengths; calculate extension; vary force systematically; graph force against extension; identify linear region/limit behaviour.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG3 - Motion

Typical focus: Investigate acceleration of a trolley

Method and analysis control: Measure distance/time or use suitable sensors; calculate speed/acceleration; vary force or mass as designed; control relevant variables.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG4 - Measuring Waves

Typical focus: Measure wave speed/frequency/wavelength

Method and analysis control: Use ripple tank/sound apparatus as appropriate; repeat distance over several wavelengths where useful; apply v=fλ and evaluate uncertainty.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG5 - Energy

Typical focus: Determine specific heat capacity

Method and analysis control: Measure mass, temperature change and energy input; minimise/consider losses; calculate c and explain systematic limitations.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG6 - Circuit components

Typical focus: Investigate I-V characteristics

Method and analysis control: Construct circuit correctly; ammeter in series, voltmeter in parallel; vary p.d.; record paired I/V values; plot and interpret characteristics.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG7 - Series and Parallel Circuits

Typical focus: Investigate series/parallel behaviour

Method and analysis control: Build circuits from diagrams; compare current/p.d./brightness or equivalent quantities; identify how changes in arrangement affect behaviour.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

PAG8 - Interactions of waves

Typical focus: Investigate reflection/refraction

Method and analysis control: Use ray box/mirror/prism or equivalent; draw normal; measure angles; repeat and evaluate alignment/thickness/parallax limitations.

- State independent, dependent and controlled variables.
- Select appropriate apparatus/range/resolution and justify it.
- Describe repeat strategy and treatment of anomalous data.
- State the graph/calculation and what it means physically.
- Identify a specific limitation before proposing an improvement.

Mathematics and extended-response control

Calculation sequence

Identify target -> choose equation -> rearrange -> convert units -> substitute -> retain guard digits -> round once -> unit/check.

Graphs

Read axis quantities/units first; derive gradient or area units before assigning physical meaning; distinguish correlation from proportionality.

6-mark Level of Response

Answer every strand, use linked scientific reasoning, include equations/data where relevant and maintain correct terminology throughout.

Evidence questions

Separate observation/data from interpretation/model, and distinguish correlation, causal mechanism and uncertainty.

References and evidence base

Accessed 12 November 2026. Specification mappings, boundaries, results statistics, equation-sheet policy and examiner-evidence labels were checked against the sources below. Diagnostic entries do not claim frequency percentages unless OCR has published them.

[SPEC] OCR GCSE (9-1) Twenty First Century Science Physics B J259 Specification, Version 4.2 (February 2024)
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[ASSESS] OCR Physics B J259 assessment materials and examiner reports
https://www.ocr.org.uk/qualifications/gcse/twenty-first-century-science-suite-physics-b-j259-from-2016/assessment/

[EQ27] OCR formulae and equation sheets for assessments in 2027
https://www.ocr.org.uk/administration/support-and-tools/subject-updates/formulae-equation-sheets-763224/

[EQ28] OCR formulae and equation sheets confirmed for 2028 onwards
https://www.ocr.org.uk/administration/support-and-tools/subject-updates/maths-science-ofqual-update-758751/

[MATH26] OCR mathematical skills handbook update for GCSE sciences
https://www.ocr.org.uk/administration/support-and-tools/subject-updates/gcse-sciences-maths-handbook-750981/