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GCSE Physics Topic Guide

AQA 8463: every topic, with Triple-only and Higher-tier content marked

How to read this guide

This guide follows the **AQA GCSE Physics (8463)** specification. **Foundation** tier assesses grades 1–5 and **Higher** tier assesses grades 4–9. **Paper 1** covers topics 1–4 and **Paper 2** covers topics 5–8; each paper is 1 hour 45 minutes and worth 50% of the grade.

(Triple only) means the content is in separate GCSE Physics but not in Combined Science: Trilogy, which covers topics 1–7 without it. **(Higher)** means Higher tier only.

1. Energy

Paper 1

- Energy stores and systems; describing energy changes
- Kinetic, elastic potential and gravitational potential energy calculations
- Specific heat capacity and energy changes in systems
- Power
- Conservation and dissipation of energy; reducing unwanted transfers
- Thermal conductivity and insulation
- Efficiency (Higher: ways to increase it)
- National and global energy resources; renewable and non-renewable

2. Electricity

Paper 1

- Circuit symbols and circuit diagrams
- Charge, current and potential difference
- Resistance and Ohm's law (V = I R)
- Resistors: ohmic conductors, filament lamps, diodes, thermistors and LDRs, with I-V graphs
- Series and parallel circuits
- Direct and alternating potential difference; mains electricity and safety (live, neutral and earth wires)
- Electrical power and energy transferred (P = V I, P = I squared R, E = P t, E = Q V)
- The National Grid
- Static electricity and electric fields (Triple only)

3. Particle model of matter

Paper 1

- Density, and the particle model of solids, liquids and gases
- Changes of state; mass is conserved
- Internal energy
- Specific heat capacity
- Specific latent heat; heating and cooling graphs
- Gas pressure and temperature
- Pressure in gases, pressure x volume = constant (Triple only)
- Doing work on a gas (Triple only, Higher)

4. Atomic structure

Paper 1

- Structure of the atom; atomic number, mass number and isotopes
- Development of the model of the atom (plum pudding, nuclear and Bohr models)
- Radioactive decay: alpha, beta, gamma and neutron emission
- Nuclear equations for alpha and beta decay
- Half-life (Higher: net decline after a number of half-lives)
- Radioactive contamination and irradiation
- Background radiation (Triple only)
- Half-lives and hazards; uses of nuclear radiation in medicine (Triple only)
- Nuclear fission and fusion (Triple only)

5. Forces: interactions

Paper 2

- Scalar and vector quantities; contact and non-contact forces
- Gravity, weight and centre of mass
- Resultant forces (Higher: free body diagrams and resolving forces)
- Work done and energy transfer
- Forces and elasticity: Hooke's law, spring constant, elastic potential energy
- Moments, levers and gears (Triple only)
- Pressure in fluids and atmospheric pressure (Triple only); pressure in a column of liquid and upthrust (Triple only, Higher)

5. Forces: motion

Paper 2

- Distance, displacement, speed and velocity
- Distance-time graphs (Higher: tangents for changing speed)
- Acceleration and velocity-time graphs (Higher: area under the graph)
- Terminal velocity (velocity-time graphs for it: Triple only)
- Newton's three laws of motion; inertia (Higher)
- Stopping distance, reaction time and braking distance
- Momentum and conservation of momentum (Higher); changes in momentum and safety features (Triple only, Higher)

6. Waves

Paper 2

- Transverse and longitudinal waves
- Amplitude, wavelength, frequency, period and wave speed (v = f x wavelength)
- Measuring the speed of sound and of ripples
- Reflection, absorption and transmission of waves (Triple only)
- Sound waves and human hearing (Triple only, Higher)
- Ultrasound, seismic waves and echo sounding (Triple only, Higher)
- The electromagnetic spectrum and its uses
- Absorption, transmission, reflection and refraction of electromagnetic waves, including wave-front diagrams and radio waves (Higher)
- Hazards of ultraviolet, X-rays and gamma rays; radiation dose
- Lenses and ray diagrams (Triple only)
- Visible light, colour and filters (Triple only)
- Black body radiation and infrared (Triple only); Earth's temperature balance (Higher)

7. Magnetism and electromagnetism

Paper 2

- Poles, permanent and induced magnets
- Magnetic fields, and plotting them with a compass
- Magnetic fields around wires and solenoids; electromagnets
- Electromagnetic devices (Triple only)
- The motor effect and Fleming's left-hand rule; F = B I l (Higher)
- Electric motors (Higher)
- Loudspeakers and headphones (Triple only, Higher)
- Induced potential and the generator effect; alternators and dynamos (Triple only, Higher)
- Microphones (Triple only, Higher)
- Transformers and the National Grid (Triple only, Higher)

8. Space physics (Triple only)

Paper 2

- The Solar System
- The life cycle of stars
- Orbital motion; natural and artificial satellites
- Red-shift and the expanding universe
- The Big Bang theory; dark matter and dark energy
- Some depth within these topics is Higher tier only

Ten required practicals

Practical skills are assessed in both papers

- 1. Specific heat capacity
- 2. Thermal insulation (Triple only)
- 3. Resistance of wires and combinations of resistors
- 4. I-V characteristics of a lamp, a diode and a resistor
- 5. Density of solids and liquids
- 6. Force and extension of a spring
- 7. Force, mass and acceleration
- 8. Waves in a ripple tank and in a solid
- 9. Reflection and refraction of light (Triple only)
- 10. Infrared radiation and different surfaces

Maths and working scientifically

At least 30% of the marks test maths skills

- Rearranging and applying equations; some must be recalled, others are given on the equation sheet
- Standard form, SI units, prefixes and significant figures
- Graphs: gradients, tangents and areas under curves
- Planning investigations: variables and fair tests
- Accuracy, precision, repeatability, reproducibility and uncertainty
- Evaluating methods and drawing conclusions from data

Not sure what your child needs?

We confirm your child's course (Triple Physics or Combined Science) and tier on a free call. Check details against the latest specification at aqa.org.uk/8463.

To book a free 15-minute diagnostic call: jratutors.co.uk or WhatsApp +44 7943 204223.