

AQA 8463 spec: Energy (4.1)

Spec	What students learn	Lesson	Route	Taught ✓
4.1.1.1	Energy stores, systems and changes in common situations	L1	Both	
4.1.1.1	Calculating how energy is redistributed in a system	L2, L3, L11	Both	
4.1.1.2	Kinetic energy: $E_k = \frac{1}{2}mv^2$	L2, L11	Both	
4.1.1.2	Gravitational potential energy: $E_p = mgh$	L2, L11	Both	
4.1.1.2	Elastic potential energy: $E_e = \frac{1}{2}ke^2$	L3, L11	Both	
4.1.1.3	Specific heat capacity: $\Delta E = mc\Delta\theta$	L4, L11	Both	
RP1	Required practical: specific heat capacity	L4, L12	Both	
4.1.1.4	Power: $P = E/t$ and $P = W/t$; comparing two motors	L5	Both	
4.1.2.1	Conservation of energy; dissipation and wasted energy	L1, L6	Both	
4.1.2.1	Reducing unwanted transfers: lubrication, insulation	L6, L9	Both	

AQA 8463 spec: Energy (4.1)

Spec	What students learn	Lesson	Route	Taught ✓
4.1.2.1	Thermal conductivity; wall thickness and cooling rate	L6, L9	Both	
RP2	Required practical: thermal insulators	L9	Physics only	
4.1.2.2	Efficiency from energy or power, as decimal or %	L7	Both	
4.1.2.2	Ways to increase the efficiency of a transfer	L7	Both · HT	
4.1.3	Main energy resources; renewable and non-renewable	L8, L10	Both	
4.1.3	Uses (transport, electricity, heating); reliability	L8, L10	Both	
4.1.3	Environmental impact; patterns and trends in use	L8, L10	Both	
4.1.3	Science vs political, social, ethical, economic limits	L8	Both	

AQA 8463 spec: Electricity (4.2)

Spec	What students learn	Lesson	Route	Taught ✓
4.2.1.1	Standard circuit symbols; draw and interpret circuits	L1, L4, L5	Both	
4.2.1.2	Charge and current; $Q = It$; same current in a loop	L1	Both	
4.2.1.3	Current, resistance and pd; $V = IR$	L2	Both	
RP3	Required practical: resistance	L2, L5	Both	
4.2.1.4	Resistors: ohmic, lamp, diode, thermistor and LDR	L2, L3, L4	Both	
RP4	Required practical: I–V characteristics	L3	Both	
4.2.2	Series and parallel circuits; series calculations	L4, L5	Both	
4.2.3.1	Direct and alternating pd; UK mains 230 V, 50 Hz	L6	Both	
4.2.3.2	Mains: three-core cable, live wire and earth dangers	L6	Both	
4.2.4.1	Power: $P = VI$ and $P = I^2R$	L7	Both	

AQA 8463 spec: Electricity (4.2)

Spec	What students learn	Lesson	Route	Taught ✓
4.2.4.2	Energy transfers in appliances; $E = Pt$ and $E = QV$	L7	Both	
4.2.4.3	The National Grid: step-up and step-down transformers	L8	Both	
4.2.5.1	Static charge: rubbing, electron transfer, sparking	L9	Physics only	
4.2.5.2	Electric fields around charged objects; sparking	L10	Physics only	

AQA 8463 spec: Particle model (4.3)

Spec	What students learn	Lesson	Route	Taught ✓
4.3.1.1	Density equation $\rho = m/V$; unit conversions	L2, L11	Both	
4.3.1.1	Particle diagrams of solids, liquids and gases	L1	Both	
4.3.1.1	Explaining density differences between states	L1, L2	Both	
RP5	Required practical: density of solids and liquids	L3	Both	
4.3.1.2	Changes of state; mass conserved; physical change	L1, L2, L8	Both	
4.3.2.1	Internal energy: total KE + PE of particles	L4	Both	
4.3.2.2	Specific heat capacity; $\Delta E = m c \Delta\theta$	L5, L11	Both	
4.3.2.3	Latent heat; $E = m L$; fusion and vaporisation	L6, L11	Both	
4.3.2.3	Experiment: specific latent heat of fusion of ice	L6	Both	
4.3.2.3	Heating and cooling graphs with changes of state	L4, L6, L8	Both	

AQA 8463 spec: Particle model (4.3)

Spec	What students learn	Lesson	Route	Taught ✓
4.3.2.3	Specific heat capacity vs specific latent heat	L5, L6, L8	Both	
4.3.3.1	Gas particle motion; temperature and pressure	L7	Both	
4.3.3.2	Gas pressure acts at right angles to surfaces	L10	Physics only	
4.3.3.2	Pressure and volume: $pV = \text{constant}$	L9, L11	Physics only	
4.3.3.3	Doing work on a gas raises its temperature	L10	Physics • HT	

AQA 8463 spec: Atomic structure (4.4)

Spec	What students learn	Lesson	Route	Taught ✓
4.4.1.1	Atom size, nucleus, electrons in energy levels	L1, L3	Both	
4.4.1.2	Atomic and mass number, isotopes, positive ions	L1, L3	Both	
4.4.1.3	Development of the atomic model; alpha scattering	L2	Both	
4.4.2.1	Radioactive decay, activity, count rate, α β γ n	L4	Both	
4.4.2.1	Penetration, range, ionising power; choosing a source	L5	Both	
4.4.2.2	Balanced nuclear equations for alpha and beta decay	L6	Both	
4.4.2.3	Half-life and the random nature of decay	L4, L7	Both	
4.4.2.3	Net decline as a ratio after n half-lives	L7	Both • HT	
4.4.2.4	Contamination vs irradiation; precautions; peer review	L8	Both	
4.4.3.1	Background radiation sources; dose in sieverts	L9	Physics only	

AQA 8463 spec: Atomic structure (4.4)

Spec	What students learn	Lesson	Route	Taught ✓
4.4.3.2	Wide range of half-lives and how hazard differs	L10	Physics only	
4.4.3.3	Medical uses of radiation; evaluating risk	L10	Physics only	
4.4.4.1	Nuclear fission and chain reactions	L11	Physics only	
4.4.4.2	Nuclear fusion; mass converted to energy	L11	Physics only	

AQA 8463 spec: Forces (4.5)

Spec	What students learn	Lesson	Route	Taught ✓
4.5.1.1	Scalar and vector quantities	L1	Both	
4.5.1.2	Contact and non-contact forces; interaction pairs	L1	Both	
4.5.1.3	Gravity, weight and $W = mg$; centre of mass	L1	Both	
4.5.1.4	Resultant forces; free-body and vector diagrams	L2	Both	
4.5.2	Work done ($W = Fs$) and energy transfer	L2, L7	Both	
4.5.3	Forces and elasticity; $F = ke$; elastic PE	L3	Both	
RP6	Required practical: force and extension of a spring	L3	Both	
4.5.4	Moments, levers and gears	L9	Physics only	
4.5.5.1.1	Pressure in a fluid: $p = F/A$	L10	Physics only	
4.5.5.1.2	Pressure in a liquid column ($p = h\rho g$); upthrust	L10	Physics • HT	

AQA 8463 spec: Forces (4.5)

Spec	What students learn	Lesson	Route	Taught ✓
4.5.5.2	Atmospheric pressure and height	L10	Physics only	
4.5.6.1.1	Distance and displacement	L4	Both	
4.5.6.1.2	Speed: typical values; $s = vt$; average speed	L4	Both	
4.5.6.1.3	Velocity; motion in a circle	L4	Both	
4.5.6.1.4	Distance–time graphs; gradient = speed	L4	Both	
4.5.6.1.5	Acceleration; v – t graphs; $v^2 - u^2 = 2as$	L5	Both	
4.5.6.2.1	Newton's First Law; inertia	L6	Both	
4.5.6.2.2	Newton's Second Law: $F = ma$; inertial mass	L6	Both	
RP7	Required practical: force, mass and acceleration	L6	Both	
4.5.6.2.3	Newton's Third Law	L1, L6	Both	

AQA 8463 spec: Forces (4.5)

Spec	What students learn	Lesson	Route	Taught ✓
4.5.6.3.1	Stopping distance: thinking + braking	L7	Both	
4.5.6.3.2	Reaction time and how to measure it	L7	Both	
4.5.6.3.3	Factors affecting braking distance	L7	Both	
4.5.6.3.4	Braking: work done by friction; large decelerations	L7	Both	
4.5.7.1	Momentum: $p = mv$	L8	Both • HT	
4.5.7.2	Conservation of momentum	L8	Both • HT	
4.5.7.3	Changes in momentum: $F = m\Delta v/\Delta t$; safety features	L11	Physics • HT	

AQA 8463 spec: Waves (4.6)

Spec	What students learn	Lesson	Route	Taught ✓
4.6.1.1	Transverse and longitudinal waves; evidence	L1	Both	
4.6.1.2	Amplitude, wavelength, frequency and period; $T = 1/f$	L2	Both	
4.6.1.2	$v = f\lambda$; measuring the speed of sound	L3, L4	Both	
4.6.1.2	Sound changing medium: v , f and λ inter-related	L9	Physics only	
RP8	Required practical: waves in a ripple tank and a solid	L4	Both	
4.6.1.3	Reflection, absorption and transmission at boundaries	L9, L11	Physics only	
RP9	Required practical: reflection and refraction of light	L11	Physics only	
4.6.1.4	Sound in solids; human hearing range 20 Hz to 20 kHz	L9	Physics • HT	
4.6.1.5	Ultrasound, echo sounding and seismic waves (P and S)	L9	Physics • HT	
4.6.2.1	Electromagnetic spectrum: order, properties and speed	L5	Both	

AQA 8463 spec: Waves (4.6)

Spec	What students learn	Lesson	Route	Taught ✓
4.6.2.2	Refraction and how materials absorb or transmit EM waves	L6	Both	
4.6.2.2	Wave front diagrams to explain refraction	L6	Both • HT	
RP10	Required practical: infrared from surfaces	L8	Both	
4.6.2.3	Radio waves from oscillating circuits; induced a.c.	L7	Both • HT	
4.6.2.3	Atoms and nuclei as sources; UV, X-ray, gamma risks; dose	L7	Both	
4.6.2.4	Uses of EM waves and why each type is suitable	L7	Both	
4.6.2.5	Convex and concave lenses; ray diagrams; magnification	L10	Physics only	
4.6.2.6	Colour, specular and diffuse reflection, filters	L11	Physics only	
4.6.3.1	Emission and absorption of infrared; temperature link	L8, L11	Physics only	
4.6.3.2	Perfect black bodies and radiation	L11	Physics only	

AQA 8463 spec: Waves (4.6)

Spec	What students learn	Lesson	Route	Taught ✓
4.6.3.2	Radiation balance and the temperature of the Earth	L11	Physics • HT	

AQA 8463 spec: Magnetism (4.7)

Spec	What students learn	Lesson	Route	Taught ✓
4.7.1.1	Poles of a magnet; permanent and induced magnets	L1	Both	
4.7.1.2	Magnetic fields; plotting with a compass	L2	Both	
4.7.1.2	Earth's magnetic field; compass as evidence for core	L2	Both	
4.7.2.1	Field around a wire and a solenoid	L3	Both	
4.7.2.1	Electromagnets: iron core, strength, uses	L3, L4	Both	
4.7.2.1	Interpret diagrams of electromagnetic devices	L4	Physics only	
4.7.2.2	Motor effect and Fleming's left-hand rule	L5	Both • HT	
4.7.2.2	Factors affecting force; $F = B I l$	L5, L6	Both • HT	
4.7.2.3	Electric motors: why the coil rotates	L7	Both • HT	
4.7.2.4	Loudspeakers and headphones	L9	Physics • HT	

AQA 8463 spec: Magnetism (4.7)

Spec	What students learn	Lesson	Route	Taught ✓
4.7.3.1	Generator effect; factors for size and direction	L9	Physics · HT	
4.7.3.1	Induced current's field opposes the change	L9	Physics · HT	
4.7.3.2	Alternators (a.c.) and dynamos (d.c.); pd-time graphs	L10	Physics · HT	
4.7.3.3	Moving-coil microphones	L10	Physics · HT	
4.7.3.4	Transformers: structure, iron core, how they work	L11	Physics · HT	
4.7.3.4	$V_p/V_s = n_p/n_s$; step-up and step-down	L11	Physics · HT	
4.7.3.4	$V_s I_s = V_p I_p$; high pd transmission in the Grid	L11	Physics · HT	

AQA 8463 spec: Space physics (4.8)

Spec	What students learn	Lesson	Route	Taught ✓
4.8.1.1	Solar System and the Milky Way galaxy	L1	Physics only	
4.8.1.1	Sun formed from a nebula; gravity causes fusion	L1, L2	Physics only	
4.8.1.1	Equilibrium: gravity collapse vs fusion expansion	L2	Physics only	
4.8.1.2	Life cycle of a Sun-sized star	L2	Physics only	
4.8.1.2	Life cycle of a star much more massive than the Sun	L2	Physics only	
4.8.1.2	Fusion makes elements; heavier than iron in a supernova	L3	Physics only	
4.8.1.3	Gravity keeps planets and satellites in circular orbits	L4	Physics only	
4.8.1.3	Planets, moons and artificial satellites compared	L1, L4	Physics only	
4.8.1.3	Circular orbit: velocity changes, speed constant	L4	Physics • HT	
4.8.1.3	Stable orbit: radius must change if speed changes	L4	Physics • HT	

AQA 8463 spec: Space physics (4.8)

Spec	What students learn	Lesson	Route	Taught ✓
4.8.2	Red-shift of light from receding galaxies	L5	Physics only	
4.8.2	Speed increases with distance: universe expanding	L5, L6	Physics only	
4.8.2	Red-shift as evidence for the Big Bang theory	L6	Physics only	
4.8.2	Since 1998: distant galaxies receding ever faster	L6	Physics only	
4.8.2	Using observations to arrive at theories	L6	Physics only	
4.8.2	Unknowns: dark mass and dark energy	L6	Physics only	