

A Level Physics Resource Pack

Below is a collection of curriculum specific broadcast material, sorted by exam board and then study theme. The document will be updated as new content is added and old content is removed.

OCR

Development of Practical Skills in Physics - planning; implementing; analysis; evaluation; use of apparatus and techniques

Foundations of Physics - Physical quantities and units; making measurements and analysing data; nature of quantities; scalars and vectors.

Forces and Motion - Motion; Kinematics; linear motion; projectile motion; forces in action; dynamics; motion with non-uniform acceleration; equilibrium; density and pressure; work, energy and power; work and conservation of energy; kinetic and potential energies; power; materials; springs; mechanical properties of matter; Newton's laws of motion and momentum; Newton's laws of motion; collisions

- <https://www.bbc.co.uk/programmes/b009mvj0> - BBC Radio 4 – IN Our Time – The Laws of Motion

Electrons, Waves and Photons - Charge and current; charge; mean drift velocity; energy, power and resistance; circuit symbols; e.m.f and p.d; resistance; resistivity; power; electrical circuits; series and parallel circuits; internal resistance; potential dividers; waves; wave motion; electromagnetic waves; superposition; stationary waves; quantum physics; photons; the photoelectric effect; wave- particle effect; wave-particle duality

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism
- <https://www.bbc.co.uk/programmes/w3cswbjn> - BBC World Service - Discovery – Bringing Schrodinger's Cat to Life
- <https://www.bbc.co.uk/programmes/b00p87r6> - BBC Radio 4 – The Infinite Monkey Cage – Quantum Physics
- <https://www.bbc.co.uk/programmes/b04v5vjz/clips> - BBC Four - The Secrets of Quantum Physics – Clips

Newtonian World and Astrophysics - Thermal physics; temperature; solid, liquid and gas; thermal properties of materials; ideal gases; circular motion; kinematics of circular motion; centripetal force; oscillations; simple harmonic oscillations; energy of a simple harmonic oscillator; damping; gravitational fields; point and spherical masses; Newtons law of gravitation; planetary motion; gravitational potential and energy; astrophysics and cosmology; stars; electromagnetic radiation from stars; cosmology.

- <https://www.bbc.co.uk/programmes/b085xpzf> - BBC Radio 4 – In Our Time – Johannes Kepler
- <https://www.bbc.co.uk/programmes/b00c84k8> - BBC Radio 4 Extra – Cosmic Quest – The Life and Death of Stars

- <https://www.bbc.co.uk/programmes/b07wc2sv> - BBC Radio 4 – A History of the Infinite – The Cosmos
- <https://www.bbc.co.uk/programmes/p004y25b> - BBC Radio 4 – In Our Time – The Planets
- <https://www.bbc.co.uk/programmes/p003k9g5> - BBC Radio 4 – In Our Time – Dark Energy
- <https://www.bbc.co.uk/programmes/b00yz3gy> - BBC Radio 4 – In Our Time – The Age of the Universe
- <https://www.bbc.co.uk/programmes/b03brwql> - BBC Radio 4 – In Our Time – Exoplanets
- <https://www.bbc.co.uk/programmes/b00s7b6r> - BBC Radio 4 – In Our Time - The Cool Universe

Particles and Medical Physics - Capacitors; energy; charging and discharging capacitors; electric fields; point and spherical charges; Coulomb's law; uniform electric field; electric potential energy; electromagnetism; magnetic fields; motion of charged particles; electromagnetism; nuclear and particle physics; the nuclear atom; fundamental particles; radioactivity; nuclear fission and fusion; medical imaging; using X-rays; diagnostic methods in medicine; using ultrasound.

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism
- <https://www.bbc.co.uk/programmes/p0054887> - BBC Radio 4 – In Our Time – Nuclear Physics
- <https://www.bbc.co.uk/programmes/b076mnkr> - BBC Radio 4 – In Our Time – The Neutron
- <https://www.bbc.co.uk/programmes/p040bc8n> - BBC World Service – The Forum – Radioactivity: Friend or Foe
- <https://www.bbc.co.uk/programmes/p03173bq> - BBC World Service – Business Daily – Elements: The Radioactives
- <https://www.bbc.co.uk/programmes/p035xfdw> - BBC World Service – Tools of the Trade – X-Rays

AQA

Measurements and their Errors - Use of SI units and their prefixes; limitation of physical measurements; estimation of physical quantities.

Particle and Radiation - Constituents of the atom; stable and unstable nuclei; particles, antiparticles and photons; particle interactions; classification of particles; quarks and antiquarks; applications of conservation laws; electromagnetic radiation and quantum phenomena; the photoelectric effect; collisions of electrons with atoms; energy levels and photon emissions; wave-particle duality.

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism
- <https://www.bbc.co.uk/programmes/p03jrx6f> - BBC World Service – Discovery – Examining the Atom
- <https://www.bbc.co.uk/programmes/p039786j> - BBC World Service – Journey to the Centre of the Atom – Quantum Theory
- <https://www.bbc.co.uk/programmes/p035xjsy> - BBC World Service – The Scale of Things – Microscopic World of the Atom
- <https://www.bbc.co.uk/programmes/p039786l> - BBC World Service – Journey to the Centre of the Atom – The Hunting of the Quark
- <https://www.bbc.co.uk/programmes/b051vlpf> - BBC Radio 4 – In Our Time – The Photon

Waves - Progressive and stationary waves; longitudinal and transverse waves; principle of superposition of waves and formation of stationary waves; refraction, diffraction and interference; diffraction; refraction at a plane surface.

Mechanics and Materials - Force, energy and momentum; scalars and vectors; moments; motion along a straight line; projectile motion; Newton's laws of motion; momentum; work, energy and power; conservation of energy.

- <https://www.bbc.co.uk/programmes/b009mvj0> - BBC Radio 4 – In Our Time – The Laws of Motion

Materials - Bulk properties of solids; the Young Modulus.

Electricity - Current electricity; current voltage characteristics; resistivity; circuits; potential divider; electromotive force and internal resistance.

Further Mechanics and Thermal Physics - Periodic motion; simple harmonic motion; simple harmonic systems; forced vibrations and resonance; thermal energy transfer; ideal gases; molecular kinetic theory model.

Fields and their Consequences - Fields; gravitational fields; gravitational field strength; gravitational potential; orbits of planets and satellites; electric fields; Coulomb's law; electric field strength; electric potential; capacitance; parallel plate capacitor; energy stored by a capacitor; capacitor charge and discharge; magnetic fields; magnetic flux density; moving charges in a magnetic field; magnetic flux and flux linkage; electromagnetic induction; alternating currents; the operation of a transformer.

- <https://www.bbc.co.uk/programmes/p0359gzg> - BBC World Service – Putting Space to Work – Orbit

Nuclear Physics - Radioactivity; Rutherford scattering; α , β and γ radiation; radioactive decay; nuclear instability; nuclear radius; mass and energy; induced fission; safety aspects.

- <https://www.bbc.co.uk/programmes/p040bc8n> - BBC World Service – The Forum – Radioactivity: Friend or Foe
- <https://www.bbc.co.uk/programmes/p033jybn> - BBC World Service – Bluffer’s Guide to Science – Radiation
- <https://www.bbc.co.uk/programmes/p03cgl8h> - BBC World Service – Experiments that Changed the World – Otto Hahn’s Nuclear Power
- <https://www.bbc.co.uk/programmes/p004t22q> - BBC World Service – Discovery – Nuclear Fusion

Astrophysics - Telescopes; astronomical telescope consisting of two converging lenses; reflecting telescope; single dish radio telescopes, I-R, U-V and X-ray telescopes; advantages of large diameter telescopes; classification of stars; classification by luminosity; absolute magnitude; classification by temperature, black-body radiation; principles of the use of stellar spectral classes; the Hertzsprung-Russell diagram; supernovae, neutron stars and black holes; cosmology; Doppler effect; Hubble's Law; Quasars; Detection of exoplanets.

- <https://www.bbc.co.uk/programmes/b085xpzf> - BBC Radio 4 – In Our Time – Johannes Kepler
- <https://www.bbc.co.uk/programmes/b00c84k8> - BBC Radio 4 Extra – Cosmic Quest – The Life and Death of Stars
- <https://www.bbc.co.uk/programmes/b07wc2sv> - BBC Radio 4 – A History of the Infinite – The Cosmos
- <https://www.bbc.co.uk/programmes/p004y25b> - BBC Radio 4 – In Our Time – The Planets
- <https://www.bbc.co.uk/programmes/p003k9g5> - BBC Radio 4 – In Our Time – Dark Energy
- <https://www.bbc.co.uk/programmes/b00yz3gy> - BBC Radio 4 – In Our Time – The Age of the Universe
- <https://www.bbc.co.uk/programmes/b03brwql> - BBC Radio 4 – In Our Time – Exoplanets
- <https://www.bbc.co.uk/programmes/b00s7b6r> - BBC Radio 4 – In Our Time - The Cool Universe
- <https://www.bbc.co.uk/programmes/p02ybwzx> - BBC World Service – Discovery – The Great Telescopes and Evolution
- <https://www.bbc.co.uk/programmes/b00nqljy> - BBC Radio 4 – In Our Time – Radiation
- <https://www.bbc.co.uk/programmes/b077ryr3> - BBC Four - The Sky at Night – Stephen Hawking on Black Holes
- <https://www.bbc.co.uk/programmes/b00c843k> - BBC Radio 4 Extra – Cosmic Quest – Squashed Stars and Black Holes
- <https://www.bbc.co.uk/programmes/b0b0lz7l> - BBC Radio 4 – Start of the Week – Mysteries of the Universe
- <https://www.bbc.co.uk/programmes/p03jrxw9> - BBC World Service – Discovery – Black Holes
- <https://www.bbc.co.uk/programmes/p049s4k7> - BBC World Service – Discovery – Black Holes: A Tale of Cosmic Death and Rebirth

- <https://www.bbc.co.uk/programmes/b090xv6w> - BBC Radio 4 – The Doppler Effect with Charles Hazlewood

Medical Physics - physics of the eye; vision; defects of vision and their correction using lenses; physics of the ear; ear as a sound detection system; sensitivity and frequency response; defects of hearing; biological measurement; simple ECG machines and the normal ECG waveform; non-ionising imaging; ultrasound imaging; fibre optics and endoscopy; magnetic resonance scanner; X-ray imaging; image detection and enhancement; absorption of X-rays; CT Scanner; Radionuclide imaging and therapy; half-life; gamma camera; use of high-energy X-rays; use of radioactive implants; imaging comparisons.

- <https://www.bbc.co.uk/programmes/b03w2w19> - BBC Radio 4 – In Our Time – The Eye
- <https://www.bbc.co.uk/programmes/p034m9ry> - BBC World Service – Soundworks – The Human Ear
- <https://www.bbc.co.uk/programmes/p033k0rf> - BBC World Service – Body Talk - Hearing
- <https://www.bbc.co.uk/programmes/p035xdfw> - BBC World Service – Tools of the Trade – X-Rays

Engineering Physics - Rotational dynamics; rotational kinetic energy; rotational motion; torque and angular acceleration; angular momentum; work and power; thermodynamics and engines; non-flow processes; the p-V diagram; engine cycles; Second Law and engines; reversed heat engines.

- <https://www.bbc.co.uk/programmes/p033wslj> - BBC World Service – Laws of Nature – Second Law of Thermodynamics
- <https://www.bbc.co.uk/programmes/p004y2bm> - BBC Radio 4 – In Our Time – The Second Law of Thermodynamics

Turning Points in Physics - the discovery of the electron; cathode rays; thermoionic emission of electrons; specific charge of the electron; principle of Millikan's determination of the electronic charge, ; Wave-particle duality; Newton's corpuscular theory of light; significance of Young's double slits experiment; electromagnetic waves; the discovery of photoelectricity; wave particle duality; electron microscopes; special relativity; the Michelson-Morley experiment; Einstein's theory of special relativity; time dilation; length contraction; mass and energy.

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism

Electronics - Discrete semiconductor devices; zener diode; photodiode; hall effect sensor; analogue and digital sensors; difference between analogue and digital signals; analogue signal processing; LC resonance filters; the ideal operational amplifier; operational amplifier; inverting amplifier configuration; non-inverting amplifier configuration; summing amplifier configuration; real operational amplifiers; digital signal processing; sequential logic; astables; data communication systems; transmission media; time-division multiplexing; amplitude and frequency modulation.

Edexcel

Working as a Physicist

Mechanics - determine the acceleration of a freely-falling object.

Electric Circuits - determine the electrical resistivity of a material; determine the e.m.f and internal resistance of an electrical cell.

Materials - Use a falling-ball method to determine the viscosity of a liquid; determine the Young modulus of a material.

Waves and Particle Nature of Light - Determine the speed of sound in air using a 2-beam oscilloscope, signal generator, speaker and microphone; investigate the effects of length, tension and mass per unit length on the frequency of a vibrating string or wire; determine the wavelength of light from a laser or other light source using a diffraction grating.

Further Mechanics - Investigate the relationship between the force exerted on an object and its change of momentum; use ICT to analyse collisions between small spheres e.g. ball bearings on a table top.

Electric and Magnetic Fields - use an oscilloscope or data logger to display and analyse the potential difference (p.d.) across a capacitor as it charges and discharges through a resistor.

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism

Nuclear Physics and Particle Physics

- <https://www.bbc.co.uk/programmes/p03jrymy> - BBC World Service – Discovery – Good Vibrations – Electromagnetism
- <https://www.bbc.co.uk/programmes/p0054887> - BBC Radio 4 – In Our Time – Nuclear Physics
- <https://www.bbc.co.uk/programmes/b076mnkr> - BBC Radio 4 – In Our Time – The Neutron
- <https://www.bbc.co.uk/programmes/p040bc8n> - BBC World Service – The Forum – Radioactivity: Friend or Foe
- <https://www.bbc.co.uk/programmes/p03173bq> - BBC World Service – Business Daily – Elements: The Radioactives

Thermodynamics - Calibrate a thermistor in a potential divider circuit as a thermostat; determine the specific latent heat of a phase change; investigate the relationship between pressure and volume of a gas at fixed temperature.

- <https://www.bbc.co.uk/programmes/p033wslj> - BBC World Service – Laws of Nature – Second Law of Thermodynamics
- <https://www.bbc.co.uk/programmes/p004y2bm> - BBC Radio 4 – In Our Time – The Second Law of Thermodynamics

Space

- <https://www.bbc.co.uk/programmes/b085xpzf> - BBC Radio 4 – In Our Time – Johannes Kepler
- <https://www.bbc.co.uk/programmes/b00c84k8> - BBC Radio 4 Extra – Cosmic Quest – The Life and Death of Stars
- <https://www.bbc.co.uk/programmes/b07wc2sv> - BBC Radio 4 – A History of the Infinite – The Cosmos
- <https://www.bbc.co.uk/programmes/p004y25b> - BBC Radio 4 – In Our Time – The Planets
- <https://www.bbc.co.uk/programmes/p003k9g5> - BBC Radio 4 – In Our Time – Dark Energy
- <https://www.bbc.co.uk/programmes/b00yz3gy> - BBC Radio 4 – In Our Time – The Age of the Universe
- <https://www.bbc.co.uk/programmes/b03brwql> - BBC Radio 4 – In Our Time – Exoplanets
- <https://www.bbc.co.uk/programmes/b00s7b6r> - BBC Radio 4 – In Our Time - The Cool Universe

Nuclear Radiation - Investigate the absorption of gamma radiation by lead.

- <https://www.bbc.co.uk/programmes/b00nqljy> - BBC Radio 4 – In Our Time – Radiation

Gravitational Fields

Oscillations - Determine the value of an unknown mass using the resonant frequencies of the oscillation of known masses

WJEC

Motion, Energy and Matter - Base physics, kinematics, dynamics, energy concepts, solids under stress, using radiation to investigate stars; particles and nuclear structure.

- <https://www.bbc.co.uk/programmes/b00d8yws> - BBC Radio 4 – Big Bang Day: Five Particles – Series

Electricity and Light - Conduction of electricity; resistance; D.C. circuits; the nature of waves; wave properties; refraction of light; photons; lasers.

- <https://www.bbc.co.uk/programmes/b007cp1s> - BBC Radio 4 – Frontiers – Superconductors
- <https://www.bbc.co.uk/programmes/p02vjpdq> - BBC World Service – Elements – Copper (Cu) – Electricity
- <https://www.bbc.co.uk/programmes/b051vlpf> - BBC Radio 4 – In Our Time – The Photon

Oscillations and Nuclei - Circular motion; vibrations; kinetic theory; thermal physics; nuclear decay; nuclear energy.

- <https://www.bbc.co.uk/programmes/p0376r6d> - BBC World Service – Science View – Nuclear Energy
- <https://www.bbc.co.uk/programmes/p004gz4y> - BBC World Service – Analysis Archive – Nuclear Energy
- <https://www.bbc.co.uk/programmes/p0376qqb> - BBC World Service – Science View – Nuclear Fusion

Field and Options - Capacitance; electrostatic and gravitational fields of force; orbits and the wide universe; magnetic fields; electromagnetic induction; alternating currents; medical physics; the physics of sports; energy and the environment

- <https://www.bbc.co.uk/programmes/b0b0lz7l> - BBC Radio 4 – Start the Week – Mysteries of the Universe
- <https://www.bbc.co.uk/programmes/b07591mr/clips> - BBC Four - The Beginning and End of the Universe - Clips

CCEA

Forces, Energy and Electricity - Physical quantities; scalars and vectors; principle of moments; linear motion; dynamics; Newton's laws of motion; linear momentum and impulse; work done, potential energy and kinetic energy; electric current, charge, potential difference and electromotive force; resistance resistivity; internal resistance and electromotive force; potential divider circuits.

- <https://www.bbc.co.uk/programmes/b009mvj0> - BBC Radio 4 – IN Our Time – The Laws of Motion
- <https://www.bbc.co.uk/programmes/b007cp1s> - BBC Radio 4 – Frontiers – Superconductors
- <https://www.bbc.co.uk/programmes/p02vjpdz> - BBC World Service – Elements – Copper (Cu) – Electricity

Waves, Photons and Astronomy - Waves; Refraction; lenses; superposition, interference and diffraction; quantum physics; wave-particle duality; astronomy.

- <https://www.bbc.co.uk/programmes/b04v5vjz/clips> - BBC Four - The Secrets of Quantum Physics – Clips

Practical Techniques and Data Analysis - Implementing; analysis; evaluation; refinement; communication.

Deformation of Solids, Thermal Physics, Circular Motion, Oscillations and Atomic and Nuclear Physics - uniform circular motion; simple harmonic motion; the nucleus; nuclear decay; nuclear energy; nuclear fission and fusion,

- <https://www.bbc.co.uk/programmes/p0376r6d> - BBC World Service – Science View – Nuclear Energy
- <https://www.bbc.co.uk/programmes/p004gz4y> - BBC World Service – Analysis Archive – Nuclear Energy
- <https://www.bbc.co.uk/programmes/p0376qqb> - BBC World Service – Science View – Nuclear Fusion

Fields, Capacitors and Particle Physics - Force fields; gravitational fields; electric fields; capacitors; magnetic fields; deflection of charged particles in electric and magnetic fields; particle accelerators; fundamental particles.

Practical Techniques and Data Analysis - Implementing; analysis; evaluation; refinement; communication.