

A-Level Physics

Glossary · Key Terms Glossary

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Key Terms Glossary

85 entries

The essential key terms across the whole A-Level Physics course, with precise exam-ready definitions.

A - E

Absolute zero	The lowest possible temperature, 0 K or $-273.15\text{ }^{\circ}\text{C}$, at which the particles of a substance have their minimum internal energy.
Activity	The number of nuclei in a radioactive sample that decay each second, measured in becquerels (Bq) and equal to λN .
Alpha particle	A helium nucleus emitted from an unstable nucleus, consisting of two protons and two neutrons, that is highly ionising but weakly penetrating.
Amplitude	The maximum displacement of a particle or wave from its equilibrium position.
Annihilation	The process in which a particle meets its antiparticle and both are destroyed, their mass being converted into a pair of photons.
Antinode	A point on a stationary wave where the amplitude of oscillation is greatest because two waves always meet in phase.
Binding energy	The energy that must be supplied to separate a nucleus completely into its individual protons and neutrons.
Boltzmann constant	The constant k linking the average kinetic energy of a gas molecule to its temperature, equal to the molar gas constant divided by the Avogadro constant.
Brownian motion	The random, erratic movement of small particles suspended in a fluid, caused by uneven collisions with fast-moving fluid molecules.
Capacitance	The charge stored per unit potential difference for a capacitor, measured in farads (F) and given by $C = Q \div V$.
Centripetal force	The resultant force directed towards the centre of a circle that keeps an object moving along a circular path.
Coherence	The property of two wave sources having a constant phase difference and the same frequency, required for a stable interference pattern.
Conservation of momentum	The principle that the total momentum of a closed system stays constant provided no external resultant force acts.
Coulomb's law	The rule that the electrostatic force between two point charges is proportional to the product of the charges and inversely proportional to the square of their separation.
Damping	The reduction in amplitude of an oscillation over time caused by resistive forces removing energy from the system.
De Broglie wavelength	The wavelength $\lambda = h \div mv$ associated with a moving particle, showing that matter has wave-like properties.

Decay constant	The probability per unit time that a given nucleus will decay, the constant λ in the exponential decay law.
Diffraction	The spreading out of a wave as it passes through a gap or around an obstacle, most pronounced when the gap is comparable to the wavelength.
Displacement	The distance moved in a particular direction from a fixed starting point, a vector quantity.
Elastic collision	A collision in which both total momentum and total kinetic energy are conserved.
Electric field strength	The force per unit positive charge at a point in a field, a vector measured in newtons per coulomb (N C^{-1}) or volts per metre (V m^{-1}).
Electromotive force	The energy transferred from a source to each coulomb of charge driven around a circuit, measured in volts (V).
Equipotential	A surface or line on which every point is at the same potential, so no work is done moving a charge or mass along it.
Excitation	The process in which an electron in an atom absorbs energy and moves to a higher energy level.

F - J

Faraday's law	The principle that the magnitude of an induced e.m.f. equals the rate of change of magnetic flux linkage through a circuit.
Free oscillation	An oscillation that occurs at a system's natural frequency once it has been displaced and released, with no driving force.
Frequency	The number of complete cycles of a wave or oscillation passing a point each second, measured in hertz (Hz).
Fundamental frequency	The lowest frequency at which a stationary wave can form on a string or in a pipe, giving a single loop or its simplest pattern.
Gamma radiation	High-energy electromagnetic radiation emitted from a nucleus, which is weakly ionising but very penetrating.
Gravitational field strength	The gravitational force per unit mass at a point, a vector measured in newtons per kilogram (N kg^{-1}).
Gravitational potential	The work done per unit mass to bring a small mass from infinity to a point in a gravitational field, always a negative quantity.
Half-life	The average time taken for the number of undecayed nuclei in a sample, or its activity, to fall to half its initial value.
Hooke's law	The rule that the extension of a spring is directly proportional to the force applied, provided the limit of proportionality is not exceeded.
Ideal gas	A model gas whose molecules have negligible volume and exert forces only during collisions, obeying the equation $pV = nRT$ exactly.
Impulse	The product of a force and the time for which it acts, equal to the change in momentum it produces.
Inelastic collision	A collision in which momentum is conserved but kinetic energy is not, some being transferred to other forms.
Interference	The superposition of two coherent waves to give a resultant of larger or smaller amplitude depending on their phase difference.
Internal energy	The total of the random kinetic and potential energies of all the particles in a system.

Internal resistance	The resistance within a source of e.m.f. that causes its terminal potential difference to fall as current is drawn.
Ionisation	The process of removing one or more electrons from a neutral atom, leaving it with a net positive charge.
Isotopes	Atoms of the same element that have the same number of protons but different numbers of neutrons.

K - O

Kinetic theory	The model that explains the behaviour of gases in terms of the random motion and collisions of large numbers of molecules.
Lenz's law	The rule that an induced current always flows in a direction that opposes the change in flux producing it, ensuring energy conservation.
Lepton	A fundamental particle, such as the electron, muon or neutrino, that does not feel the strong nuclear force.
Magnetic flux	The product of magnetic flux density and the area perpendicular to it, measured in webers (Wb).
Magnetic flux density	A measure of the strength of a magnetic field, defined by the force on a current-carrying conductor and measured in tesla (T).
Mass defect	The difference between the total mass of the separate nucleons and the smaller mass of the nucleus they form.
Moment of a force	The turning effect of a force about a point, equal to the force times the perpendicular distance from the point to its line of action.
Momentum	The product of an object's mass and its velocity, a vector quantity measured in kilogram metres per second (kg m s^{-1}).
Natural frequency	The frequency at which a system oscillates freely when displaced and released without a driving force.
Neutrino	A nearly massless, chargeless lepton released in beta decay to conserve energy and momentum.
Newton's second law	The law stating that the resultant force on a body equals the rate of change of its momentum, giving $F = ma$ for constant mass.
Node	A point on a stationary wave where the amplitude is always zero because two waves always meet in antiphase.
Nuclear fission	The splitting of a large unstable nucleus into two smaller nuclei, releasing energy and several neutrons.
Nuclear fusion	The joining of two light nuclei to form a heavier nucleus, releasing energy because the product is more tightly bound.
Ohm's law	The rule that the current through a metallic conductor is proportional to the potential difference across it at constant temperature.

P - T

Pair production	The creation of a particle and its antiparticle from a single high-energy photon, possible only above a threshold energy.
Period	The time taken for one complete cycle of a wave or oscillation, equal to one divided by the frequency.

Phase difference	The fraction of a cycle, often stated in radians or degrees, by which one oscillation leads or lags another.
Photoelectric effect	The emission of electrons from a metal surface when light above a threshold frequency falls on it, providing evidence for the photon model.
Photon	A discrete packet of electromagnetic energy of magnitude $E = hf$, the quantum of the electromagnetic field.
Potential difference	The energy transferred per unit charge between two points in a circuit, measured in volts (V).
Potential divider	A circuit of two or more resistors in series that splits a supply voltage in proportion to their resistances.
Power	The rate at which energy is transferred or work is done, measured in watts (W).
Progressive wave	A wave that transfers energy from one place to another as its oscillations travel through a medium or space.
Quark	A fundamental particle that feels the strong force and combines in twos or threes to form hadrons such as protons and neutrons.
Radian	The angle subtended at the centre of a circle by an arc equal in length to the radius, with 2π radians in a full turn.
Refraction	The change in direction of a wave as it crosses a boundary between media in which it travels at different speeds.
Resonance	The large-amplitude response of a system driven at its natural frequency, when energy is transferred most efficiently.
Root mean square	The value of a steady current or voltage that delivers the same average power as a given alternating one, equal to the peak value divided by $\sqrt{2}$.
Simple harmonic motion	Oscillation in which acceleration is proportional to displacement from equilibrium and always directed towards it.
Specific heat capacity	The energy needed to raise the temperature of one kilogram of a substance by one kelvin without a change of state.
Specific latent heat	The energy needed to change the state of one kilogram of a substance with no change in temperature.
Stationary wave	A wave pattern formed when two identical progressive waves travel in opposite directions and superpose, transferring no net energy.
Stress	The force applied per unit cross-sectional area of a material, measured in pascals (Pa).
Strong nuclear force	The short-range attractive force between nucleons that holds the nucleus together against electrostatic repulsion.
Superposition	The principle that when two waves meet the resultant displacement is the vector sum of their individual displacements.
Threshold frequency	The minimum frequency of light needed to release electrons from a particular metal surface in the photoelectric effect.
Time constant	The product RC for a capacitor circuit, the time taken for the charge or voltage to fall to about 37 % of its initial value.

U - Z

Uniform field	A region in which the field strength has the same magnitude and direction at every point, shown by evenly spaced parallel field lines.
Wave-particle duality	The principle that all matter and radiation show both wave-like and particle-like behaviour depending on the experiment.
Wavelength	The distance between two adjacent points on a wave that are in phase, such as crest to crest, given the symbol λ .
Work done	The energy transferred when a force moves its point of application, equal to the force times the distance moved along its line of action.
Work function	The minimum energy needed to release an electron from the surface of a particular metal.
Young modulus	The ratio of tensile stress to tensile strain for a material in its elastic region, a measure of its stiffness.