T1 kinematics	T1 distance	T1 scalar
T1 displacement	T1 vector	T1 speed
T1 velocity	T1 acceleration	T1 average

T1 A quantity described by magnitude alone, with no direction.	T1 The total length of a path travelled.	T1 The description of motion using quantities such as position, velocity and acceleration without analysing its causes.
T1 The distance travelled per unit time.	T1 A quantity with both magnitude and direction.	T1 The straight-line change in position, including direction.
T1 A single value that represents a set of values, usually their mean.	T1 The rate of change of velocity.	T1 The rate of change of displacement.

T1 instantaneous	T1 tangent	T1 uniform acceleration
T1 free fall	T1 projectile	T1 component
T1 trajectory	T1 time of flight	T1 range

T1 Acceleration that is constant in size and direction.	T1 A straight line that touches a curve at a point and has the same direction there.	T1 Referring to a particular instant rather than an average over a time interval.
T1 The part of a vector acting in a specified direction.	T1 An object moving after being launched, typically modelled under gravity with air resistance neglected.	T1 Motion under gravity alone, with other forces neglected.
T1 The horizontal distance travelled by a projectile between its launch and a specified landing level or point.	T1 The total time that a projectile spends in the air.	T1 the curve the position vector traces through space

T1 fluid resistance	T1 drag	T1 terminal speed
T2 force	T2 interaction	T2 inertia
T2 free-body diagram	T2 resultant force	T2 translational equilibrium

T1 The constant speed at which the drag on a falling object balances the driving force.	T1 A resistive force exerted by a fluid on an object moving relative to it.	T1 The drag force on an object moving through a liquid or gas.
T2 An object's resistance to changes in its state of motion, measured by its mass in translational motion.	T2 A mutual force between objects or particles.	T2 An interaction that can change an object's motion or shape.
T2 The state of a body with zero resultant force on it.	T2 The single force equivalent to all the forces acting together.	T2 A diagram showing all external forces acting on a selected object.

T2 static friction	T2 dynamic friction	T2 spring constant
T2 Stokes' law	T2 viscosity	T2 buoyancy
T2 momentum	T2 conservation of momentum	T2 impulse

T2 The force required per unit extension of a spring in its linear range.	T2 The resistive force between two surfaces sliding over each other.	T2 The force that resists the start of sliding between two surfaces at rest relative to each other.
T2 The upward force on an object immersed in a fluid, equal to the weight of the fluid displaced.	T2 A measure of a fluid's resistance to flow or to relative motion between adjacent layers.	T2 The law $F = 6\pi\eta rv$ for the viscous drag on a small sphere moving slowly through a fluid.
T2 The change in momentum, equal to force multiplied by its duration for a constant force.	T2 Total momentum remains constant when no resultant external force acts.	T2 The product of mass and velocity.

T2 elastic collision	T2 inelastic collision	T2 explosion
T2 period	T2 angular velocity	T2 centripetal acceleration
T2 centripetal force	T3 conservation of energy	T3 work

T2 A rapid release of stored energy that can cause an object or system to separate into parts moving apart.	T2 A collision in which the total kinetic energy of the colliding objects is not conserved.	T2 A collision in which total kinetic energy and momentum are conserved.
T2 The acceleration towards the centre of a circular path, caused by the changing direction of velocity.	T2 The rate of change of angular displacement, with a direction associated with the axis of rotation.	T2 The time taken for one complete oscillation or cycle.
T3 Energy transferred by a force acting through a displacement.	T3 The principle that energy cannot be created or destroyed, only transferred or transformed.	T2 The resultant force towards the centre of a circular path.

T3 mechanical energy	T3 kinetic energy	T3 gravitational potential energy
T3 elastic potential energy	T3 power	T3 efficiency
T3 Sankey diagram	T3 energy density	T4 rigid body

T3 Energy stored because of an object's position in a gravitational field.	T3 The energy an object has because of its motion.	T3 The sum of kinetic, gravitational potential and elastic potential energy.
T3 The fraction of total energy or power input converted to useful output.	T3 The rate of energy transfer or work done.	T3 Energy stored when an elastic object is stretched or compressed.
T4 An idealised object whose shape and distances between its particles do not change.	T3 The energy released per unit volume of a fuel.	T3 An energy-flow diagram with arrow widths proportional to the amounts transferred.

T4 torque	T4 lever arm	T4 couple
T4 rotational equilibrium	T4 centre of mass	T4 angular displacement
T4 angular acceleration	T4 moment of inertia	T4 angular momentum

T4 Two equal and opposite parallel forces acting along different lines, producing a turning effect without a resultant force.	T4 The perpendicular distance from a pivot or axis to a force's line of action.	T4 The turning effect of a force, given by the force multiplied by the perpendicular distance of its line of action from the pivot.
T4 The change in an object's angular position about a reference axis.	T4 The point representing an object's or system's mass-weighted average position.	T4 A state in which the net torque on an object is zero and its angular momentum does not change.
T4 the spin storage I omega, conserved when no external torque acts	T4 A measure of an object's resistance to angular acceleration about a specified axis, depending on its mass and how far that mass lies from the axis.	T4 The rate of change of angular velocity with time.

T4 conservation of angular momentum	T4 angular impulse	T4 rotational kinetic energy
T5 reference frame	T5 event	T5 inertial reference frame
T5 Galilean relativity	T5 special relativity	T5 Lorentz transformation

T4 Energy due to rotation, equal to one half of the moment of inertia times angular speed squared for a rigid body about a fixed axis.	T4 The time integral of torque, equal to the change in angular momentum.	T4 The principle that total angular momentum stays constant when no external torque acts on a system.
T5 A frame that is not accelerating.	T5 An occurrence or happening.	T5 A coordinate system and reference objects used to describe positions and motion.
T5 The equations that convert positions and times between inertial frames in special relativity.	T5 Einstein's theory of motion in inertial frames, based on the constancy of the speed of light.	T5 Newton's laws of motion are the same in every inertial frame.

T5 Lorentz factor	T5 proper time interval	T5 time dilation
T5 proper length	T5 length contraction	T5 space–time interval
T5 relativity of simultaneity	T5 space–time diagram	T5 world line

T5 The result that a moving clock is measured to run slow compared with clocks in the observer's frame.	T5 The time between two events measured in the frame in which they occur at the same place.	T5 The factor $\gamma = 1/\sqrt{(1 - v^2/c^2)}$ that sets the size of relativistic effects.
T5 A combination of space and time separations that has the same value in all inertial frames.	T5 The shortening of a moving object's length, measured along its motion, compared with its proper length.	T5 The length of an object measured in the frame in which it is at rest.
T5 The path of an object on a space–time diagram.	T5 A graph of time against position that shows the paths of objects and light in relativity.	T5 The result that events simultaneous in one frame need not be simultaneous in another.

T5 muon	T6 molecular model	T6 density
T6 Celsius scale	T6 Kelvin scale	T6 absolute zero
T6 average kinetic energy	T6 Boltzmann constant	T6 internal energy

T6 Mass per unit volume.	T6 A picture of matter as particles in motion, used to explain gas behaviour.	T5 A heavier, unstable relative of the electron, with the same charge.
T6 The lowest temperature on the thermodynamic temperature scale, equal to zero kelvin.	T6 The absolute temperature scale, which starts at absolute zero and has degrees the same size as Celsius degrees.	T6 The temperature scale in degrees with 0 °C near the freezing point of water and 100 °C near its boiling point at standard pressure.
T6 The total microscopic kinetic and potential energy of a system's particles, excluding its overall motion and position as a whole.	T6 The constant $k = 1.38 \times 10^{-23}$ J K^{-1} that links the average energy of particles to absolute temperature.	T6 The mean translational energy per particle of a gas, proportional to its absolute temperature.

T6 thermal equilibrium	T6 specific heat capacity	T6 phase change
T6 melting	T6 freezing	T6 boiling
T6 condensing	T6 specific latent heat	T6 specific latent heat of fusion

T6 A transition between physical phases, such as melting, boiling or condensation.	T6 The energy needed to raise the temperature of one kilogram of a substance by one kelvin or one degree Celsius.	T6 A condition in which bodies have the same temperature and no net heat flows between them.
T6 Vaporisation throughout a liquid when its vapour pressure matches the surrounding pressure.	T6 The change of state from liquid to solid.	T6 The change of a substance from solid to liquid.
T6 The energy needed to change 1 kg of solid to liquid at constant temperature.	T6 The energy needed to change the phase of 1 kg of a substance at constant temperature.	T6 Changing from gas to liquid.

T6 specific latent heat of vaporization	T6 evaporation	T6 conduction
T6 thermal conductivity	T6 temperature gradient	T6 convection
T6 convection current	T6 thermal radiation	T6 black body

T6 The transfer of thermal energy through a material by particle collisions and free electrons, without bulk movement.	T6 The escape of particles from the surface of a liquid into its vapour without the whole liquid boiling.	T6 The energy needed to change 1 kg of liquid to gas at constant temperature.
T6 Heat transfer through the bulk movement of a fluid.	T6 The change in temperature per unit distance through a material.	T6 A measure of how well a material conducts thermal energy.
T6 An ideal surface that absorbs all radiation falling on it and is also the best possible emitter.	T6 Electromagnetic radiation emitted by an object because of its temperature.	T6 The circulating flow of a fluid in which warmer, less dense fluid rises and cooler fluid sinks.

T6 luminosity	T6 Stefan–Boltzmann constant	T6 Wien's displacement law
T6 apparent brightness	T7 radiative equilibrium	T7 solar constant
T7 albedo	T7 emissivity	T7 greenhouse effect

T6 For a blackbody, the wavelength of peak emission per unit wavelength is inversely proportional to its absolute temperature.	T6 The constant $\sigma = 5.67 \times 10^{-8}$ W m^{-2} K^{-4} in the law for power radiated by a black body.	T6 The total energy a star or other source emits as radiation per unit time.
T7 The solar power per unit area received at the top of Earth's atmosphere, about 1360 W m^{-2}.	T7 The state in which a body absorbs and emits radiation at equal rates, so its temperature stays constant.	T6 The power received from a star per unit area at the observer.
T7 The warming caused when atmospheric gases absorb and emit infrared radiation, reducing the rate at which energy escapes to space.	T7 The ratio of the power radiated by a surface to that of a black body of the same area and temperature.	T7 The fraction of the radiation incident on a surface that the surface reflects.

T7 greenhouse gas	T7 photon	T7 natural frequency
T7 resonance	T7 enhanced greenhouse effect	T8 pressure
T8 amount of substance	T8 Avogadro constant	T8 molar mass

T7 A frequency at which a system oscillates freely after being disturbed.	T7 A quantum of electromagnetic radiation with energy equal to Planck's constant multiplied by its frequency.	T7 A gas that absorbs and emits infrared radiation, contributing to atmospheric warming.
T8 Force acting normally per unit area.	T7 The extra warming caused by human activities that increase the concentration of greenhouse gases.	T7 In the trial method, overlap with the complementary function requires extra factors of x. An undamped system forced at its natural frequency can have a growing response.
T8 The mass of one mole of a substance.	T8 The number of specified elementary entities in one mole, exactly 6.02214076 times ten to the power 23 per mole.	T8 The quantity of particles in a sample, measured in moles.

T8

absolute zero

T8

pressure–volume diagram

T8

isotherm

T8

molar gas constant

T8

ideal gas law

T8

ideal gas

T8

kinetic theory

T8

root mean square speed

T8

monatomic

T8 A line on a pressure–volume diagram joining states at one temperature.	T8 A graph of a gas's pressure against its volume, on which the area under a curve gives the work done.	T8 The lowest temperature on the thermodynamic temperature scale, equal to zero kelvin.
T8 A model of a gas with point particles that exert no intermolecular forces except during perfectly elastic collisions.	T8 The relation pV=nRT connecting pressure, volume, amount and absolute temperature in the ideal-gas model.	T8 The constant R = 8.31 J K^{-1} mol^{-1} in the ideal gas equation.
T8 Consisting of individual atoms rather than molecules containing several atoms.	T8 The square root of the mean of the squares of particle speeds in a gas.	T8 A model that explains properties of matter through the motion and interactions of its particles.

T8 real gas	T9 closed system	T9 isolated system
T9 first law of thermodynamics	T9 isovolumetric process	T9 isobaric process
T9 isothermal process	T9 adiabatic process	T9 heat engine

T9 A system that exchanges neither matter nor energy with its surroundings in thermodynamics, or experiences no net external influence in the relevant mechanical model.	T9 A system that does not exchange matter with its surroundings, although energy may be transferred.	T8 A gas that deviates from ideal behaviour, especially at high pressure or low temperature.
T9 A change of state of a gas at constant pressure.	T9 A change of state of a gas at constant volume.	T9 Energy is conserved: a system's internal energy changes through heat transfer and work, with signs determined by the chosen convention.
T9 A device that takes in thermal energy from a hot reservoir and converts part of it into work.	T9 A change of state of a gas in which no thermal energy enters or leaves the gas.	T9 A change of state of a gas at constant temperature.

T9

cycle

T9

efficiency

T9

Carnot cycle

T9

entropy

T9

microstate

T9

macrostate

T9

second law of thermodynamics

T10

electromotive force

T10

chemical cell

T9 The ideal reversible heat-engine cycle of two isothermal and two adiabatic stages, with the highest possible efficiency.	T9 The fraction of total energy or power input converted to useful output.	T9 The area enclosed by the loop.
T9 A description of a system by bulk properties such as pressure, volume and temperature.	T9 One particular arrangement of a system's particles and energy consistent with its macrostate.	T9 A thermodynamic measure related to energy dispersal and the number of microscopic arrangements consistent with a system's macroscopic state.
T10 A device that converts chemical energy into electrical energy.	T10 The energy supplied by a source per unit charge passing through it.	T9 The law that the entropy of an isolated system never decreases.

T10 solar cell	T10 electric current	T10 charge carrier
T10 conductor	T10 insulator	T10 potential difference
T10 resistance	T10 resistivity	T10 Ohm's law

T10 A particle that transports electric charge, such as an electron or a mobile ion.	T10 The rate of flow of electric charge.	T10 A device that converts light directly into electrical energy.
T10 The energy transferred per unit charge between two points.	T10 A material in which electric charge does not move readily under ordinary conditions.	T10 A material through which electric charge or thermal energy can pass readily.
T10 The rule that current is proportional to potential difference across an ohmic conductor when physical conditions such as temperature are constant.	T10 A material property relating resistance to length and cross-sectional area at a specified temperature.	T10 The ratio of potential difference to electric current.

T10 ohmic	T10 filament lamp	T10 non-ohmic
T10 thermistor	T10 light-dependent resistor	T10 potentiometer
T10 internal resistance	T10 terminal potential difference	T10 potential divider

T10 Not obeying Ohm's law, so current is not proportional to potential difference.	T10 A lamp with a thin metal wire that glows when hot; its resistance rises with temperature.	T10 Obeying Ohm's law, so current is proportional to potential difference at constant temperature.
T10 A variable resistor used as a potential divider to give an adjustable voltage.	T10 A resistor whose resistance generally decreases as the intensity of incident light increases.	T10 A resistor whose resistance changes strongly with temperature, commonly decreasing as temperature rises.
T10 A circuit arrangement that uses series resistances or impedances to obtain a fraction of an applied potential difference.	T10 The potential difference across a cell's terminals when it supplies current.	T10 The effective resistance within a source of electrical energy that causes its terminal voltage to change when current flows.

T11 simple harmonic motion	T11 oscillation	T11 equilibrium position
T11 restoring force	T11 displacement	T11 angular frequency
T11 amplitude	T11 period	T11 frequency

T11 The point at which an oscillating object has zero resultant force on it.	T11 A repeated back-and-forth motion about a fixed position.	T11 Oscillation in which acceleration is proportional to displacement from equilibrium and directed towards equilibrium.
T11 The rate of change of phase in radians per second, equal to two pi times frequency.	T11 The straight-line change in position, including direction.	T11 A force acting towards an object's equilibrium position after displacement.
T11 The number of complete cycles per unit time.	T11 The time taken for one complete oscillation or cycle.	T11 The maximum displacement from an equilibrium position.

T11 isochronous	T11 spring constant	T11 simple pendulum
T11 total energy	T11 damping	T11 phase angle
T11 phase difference	T11 antiphase	T12 travelling wave

T11 A small mass on a light string that swings with a period set by its length and g.	T11 The force required per unit extension of a spring in its linear range.	T11 Having a period that does not depend on the amplitude of the oscillation.
T11 The stage of an oscillation expressed as an angle.	T11 The reduction of oscillation amplitude caused by energy transfer out of the oscillating system.	T11 The sum of an object's kinetic and potential energies; in relativity, its rest energy plus kinetic energy.
T12 A disturbance that moves through a medium (or through space), transferring energy from one place to another.	T11 Having a phase difference of half a cycle, so corresponding oscillations are opposite.	T11 The difference in position within an oscillation cycle between two oscillations or points on waves.

T12 medium	T12 transverse wave	T12 longitudinal wave
T12 compression	T12 rarefaction	T12 wavelength
T12 wave speed	T12 sound	T12 ultrasound

T12 A wave whose oscillations are parallel to its direction of energy transfer.	T12 A wave whose oscillations are perpendicular to its direction of energy transfer.	T12 The material or environment through which a wave or other physical influence is transmitted.
T12 The distance between corresponding points on successive waves.	T12 A region of a longitudinal wave where the particles are further apart than at equilibrium.	T12 A region of a longitudinal wave where the particles are closer together than at equilibrium.
T12 Sound with a frequency above the upper limit of normal human hearing, conventionally above 20 kilohertz.	T12 A mechanical wave and needs a medium; there is no air on the Moon.	T12 The rate at which a wave disturbance or a point of constant phase travels through a medium.

T12 electromagnetic wave	T12 electromagnetic spectrum	T13 wavefront
T13 ray	T13 boundary	T13 reflection
T13 normal	T13 transmission	T13 refraction

T13 A line (or surface) joining points that are in phase, for example all the points on one crest.	T12 The complete range of electromagnetic radiation, ordered by frequency or wavelength.	T12 Waves of coupled electric and magnetic fields that transfer energy and can travel through a vacuum.
T13 The change in direction of a wave at a boundary so that it returns into its original medium.	T13 The surface between two media or regions, at which a wave may be reflected or refracted.	T13 A line showing the direction in which the wave travels; it is perpendicular to wavefronts in the ordinary isotropic wave model used here.
T13 A change in a wave's direction when it crosses a boundary at an angle and its speed changes.	T13 The passage of a wave through a medium or across a boundary.	T13 A line perpendicular to a surface at a given point.

T13 refractive index	T13 Snell's law	T13 critical angle
T13 total internal reflection	T13 optical fibre	T13 diffraction
T13 aperture	T13 principle of superposition	T13 pulse

T13 The incidence angle in the higher-index medium for which the refracted ray travels along the boundary.	T13 The law $n_1 \sin \theta_1 = n_2 \sin \theta_2$ relating the angles of incidence and refraction at a boundary.	T13 For a medium, the ratio of the speed of light in a vacuum to its phase speed in that medium.
T13 The spreading or redistribution of waves as they pass an edge or aperture.	T13 A thin glass strand that guides light by total internal reflection.	T13 When all of a wave is reflected back into a denser medium because it meets the boundary above the critical angle.
T13 A short single disturbance that travels through a medium.	T13 The rule that the resultant displacement where waves meet is the vector sum of their individual displacements.	T13 The opening through which a wave passes.

T13 interference	T13 coherent	T13 path difference
T13 constructive interference	T13 destructive interference	T13 fringe
T13 fringe separation	T13 envelope	T13 modulate

T13 The difference in the distances travelled by two waves from their sources to a point.	T13 Having the same frequency and a constant phase difference.	T13 The superposition of waves, producing a combined displacement that depends on their relative phase.
T13 A band of greater or lesser intensity in an interference or diffraction pattern.	T13 The superposition of waves out of phase, which gives a smaller resultant amplitude.	T13 The superposition of waves in phase, which gives a larger resultant amplitude.
T13 To vary a property of a wave, such as its amplitude or intensity.	T13 The smooth outline that links the peaks of a modulated wave or a diffraction pattern.	T13 The distance between the centres of adjacent bright or dark interference fringes.

T13 diffraction grating	T13 spectrum	T14 standing wave
T14 node	T14 antinode	T14 boundary condition
T14 harmonic	T14 first harmonic	T14 natural frequency

T14 A wave pattern with fixed nodes and antinodes formed by the superposition of waves travelling in opposite directions.	T13 A distribution of electromagnetic radiation according to wavelength or frequency.	T13 An optical component with many equally spaced slits or grooves that produces interference maxima at particular angles.
T14 A specified value or relationship that a solution must satisfy at a boundary or stated position, helping determine constants or allowable solutions.	T14 A position of maximum oscillation amplitude in a standing wave.	T14 A point in a stationary wave where the displacement amplitude is zero.
T14 A frequency at which a system oscillates freely after being disturbed.	T14 The standing wave with the lowest frequency on a string or in a pipe.	T14 A component of a periodic signal at a whole-number multiple of the fundamental frequency.

T14 driving frequency	T14 resonance	T14 damping
T14 light damping	T14 critical damping	T14 heavy damping
T15 Doppler effect	T15 redshift	T15 blueshift

T14 The reduction of oscillation amplitude caused by energy transfer out of the oscillating system.	T14 In the trial method, overlap with the complementary function requires extra factors of x. An undamped system forced at its natural frequency can have a growing response.	T14 The frequency of the external influence acting on an oscillating system.
T14 Damping so strong that a displaced system returns slowly to equilibrium without oscillating.	T14 The damping that returns a system to equilibrium in the shortest time without oscillating.	T14 Damping small enough for a system to oscillate with slowly decreasing amplitude.
T15 A shift of spectral lines to shorter wavelengths, caused by a source moving towards the observer.	T15 A shift of observed spectral features towards longer wavelengths.	T15 A change in observed wave frequency caused by relative motion between a source and an observer.

T15 spectral line	T16 Kepler's laws	T16 ellipse
T16 focus	T16 point mass	T16 Newton's universal law of gravitation
T16 gravitational field	T16 gravitational field strength	T16 field line

T16 A closed oval curve, the shape of a planetary orbit, with two foci.	T16 Three laws describing planetary orbits: elliptical paths, equal areas in equal times, and T^2 proportional to a^3.	T15 A narrow band of one wavelength in a spectrum, produced by a transition between energy levels.
T16 The law that two point masses attract with a force proportional to their masses and inversely proportional to the square of their separation.	T16 An idealised object whose mass is treated as concentrated at a single point.	T16 One of the two fixed points of an ellipse; the Sun lies at one focus of a planet's orbit.
T16 An imaginary curve whose tangent at each point indicates the direction of a field.	T16 The gravitational force per unit mass on a small test mass at a point.	T16 A region in which a mass experiences gravitational force, described locally by force per unit mass.

T16 uniform field	T16 orbit	T16 centripetal force
T16 geostationary orbit	T16 apparent weightlessness	T16 gravitational potential energy
T16 gravitational potential	T16 potential gradient	T16 equipotential surface

T16 The resultant force towards the centre of a circular path.	T16 The path of an object moving around another body under a force such as gravity.	T16 A field with the same magnitude and direction at every point in the region considered.
T16 Energy stored because of an object's position in a gravitational field.	T16 The sensation of having no weight in free fall, when no contact force supports the body.	T16 An equatorial orbit with a 24-hour period, in which a satellite stays above one point on Earth.
T16 A surface on which every point has the same potential, so no work is done moving along it.	T16 The rate of change of potential with distance, equal in size to the field strength.	T16 Potential energy per unit mass at a point in a gravitational field, relative to a specified reference.

T16 orbital speed	T16 escape speed	T16 viscous drag
T17 electric charge	T17 elementary charge	T17 charge is conserved
T17 electrostatic induction	T17 earthed	T17 charge is quantized

T16 The resistive force on an object moving through a viscous fluid.	T16 The smallest speed that lets a body move infinitely far away, with no further push.	T16 The speed of an object in orbit around a larger body.
T17 The total electric charge of an isolated system never changes.	T17 The magnitude of the charge on a proton or electron, about 1.60×10^{-19} C.	T17 A physical property responsible for electric forces and interactions, occurring with positive or negative sign.
T17 All observable charge comes in whole-number multiples of the elementary charge.	T17 Connected to the ground, so that charge can flow to or from it.	T17 The redistribution of charge in a body caused by a nearby charge, without contact.

T17 Coulomb's law	T17 permittivity	T17 electric field
T17 electric field strength	T17 electric field line	T17 edge effect
T17 magnetic field	T17 magnetic field line	T17 right-hand grip rule

T17 A region in which an electric charge experiences an electric force.	T17 A property of a medium that sets the strength of the electric force through it.	T17 The rule that the electrostatic force between point charges is proportional to their charge product and inversely proportional to the square of their separation.
T17 The bending of electric field lines at the ends of parallel plates, where the field is no longer uniform.	T17 A line showing the direction of the force on a positive test charge at each point in a field.	T17 The electric force per unit positive charge at a point.
T17 A rule that gives the direction of the magnetic field around a current.	T17 A line showing the direction of the force on a north pole at each point in a magnetic field.	T17 A region in which magnetic materials, moving charges or currents experience magnetic forces.

T17 solenoid	T17 electric potential energy	T17 electric potential
T17 potential is a scalar	T17 potential gradient	T17 electronvolt
T17 equipotential surface	T18 parabola	T18 tesla

T17 Electric potential energy per unit positive charge at a point, relative to a chosen reference.	T17 Energy associated with the position or arrangement of electric charges in an electric field.	T17 A coil of wire that produces a magnetic field when an electric current flows through it.
T17 A unit of energy equal to the energy gained by one elementary charge moving through a potential difference of one volt.	T17 The rate of change of potential with distance, equal in size to the field strength.	T17 Potential has magnitude only, so contributions from several sources add algebraically.
T18 The unit of magnetic flux density, equal to one weber per square metre.	T18 The curve formed by points equally distant from a fixed point and a fixed straight line.	T17 A surface on which every point has the same potential, so no work is done moving along it.

T18 Fleming's left-hand rule	T18 charge-to-mass ratio	T18 velocity selector
T18 motor effect	T19 magnetic flux	T19 normal
T19 weber	T19 flux linkage	T19 induced

T18 A device using crossed electric and magnetic fields to allow particles of a selected speed to pass undeflected.	T18 The charge of a particle divided by its mass, measured in C kg^{-1}.	T18 A rule that links the directions of current, magnetic field and force on a conductor.
T19 A line perpendicular to a surface at a given point.	T19 A measure of the magnetic field passing through a surface, accounting for field strength, area and orientation.	T18 The force on a current-carrying conductor in a magnetic field.
T19 Produced by a changing magnetic flux or by a nearby charge, not by direct connection.	T19 The sum of magnetic fluxes through the turns of a coil; for identical turns it is the flux per turn multiplied by the number of turns.	T19 The SI unit of magnetic flux, equal to one tesla square metre.

T19 induced current	T19 Faraday's law	T19 Lenz's law
T19 generator	T19 transformer	T19 self-induction
T19 eddy currents	T20 nucleus	T20 plum-pudding model

T19 An induced current or electromotive force acts in a direction that opposes the change in magnetic flux that produces it.	T19 The induced electromotive force equals the negative rate of change of magnetic flux linkage.	T19 A current driven in a closed circuit by an induced electromotive force.
T19 The induction of an electromotive force in a coil by the changing current in that same coil.	T19 A device that changes alternating potential difference using electromagnetic induction between coils.	T19 A device that induces an electromotive force by rotating a coil in a magnetic field.
T20 The disproved atomic model of electrons embedded in a sphere of positive charge.	T20 The small, dense central part of an atom, containing protons and usually neutrons.	T19 Circulating induced currents in a conductor exposed to a changing magnetic flux.

T20

nuclear model

T20

alpha particle

T20

gold foil

T20

evacuated

T20

nuclide

T20

nucleon number

T20

proton number

T20

isotope

T20

spectrum

T20 The thin metal target in the Geiger–Marsden alpha-scattering experiment.	T20 A helium-4 nucleus of two protons and two neutrons, emitted in alpha decay.	T20 The picture of an atom as a tiny, dense, positive nucleus surrounded by electrons.
T20 The total number of protons and neutrons in an atomic nucleus.	T20 An atomic species identified by its numbers of protons and neutrons.	T20 With the air pumped out to leave a near vacuum.
T20 A distribution of electromagnetic radiation according to wavelength or frequency.	T20 An atom of an element with the same proton number but a different neutron number from another atom of that element.	T20 The number of protons in an atomic nucleus, which identifies its element.

T20 continuous spectrum	T20 emission spectrum	T20 absorption spectrum
T20 discrete	T20 energy level	T20 photon
T20 line spectrum	T20 ground state	T20 ionisation energy

T20 The pattern of wavelengths absorbed by a substance, often seen as missing bands or lines in transmitted light.	T20 A set of bright lines on a dark background.	T20 A spectrum containing all wavelengths across a range, with no gaps.
T20 A quantum of electromagnetic radiation with energy equal to Planck's constant multiplied by its frequency.	T20 An allowed value of energy that a quantum system can have.	T20 Existing only in separate, distinct values, not over a continuous range.
T20 The energy needed to remove an electron completely from an atom in its ground state.	T20 The lowest-energy state available to an atom, particle or other quantum system.	T20 A spectrum of separate wavelengths, characteristic of the element that produces it.

T20 distance of closest approach	T20 strong nuclear force	T20 femtometre
T20 angular momentum	T20 principal quantum number	T21 photoelectric effect
T21 photoelectron	T21 threshold frequency	T21 work function

T20 A unit of length equal to 10^{-15} m, typical of nuclear sizes.	T20 The residual strong interaction that binds protons and neutrons together in nuclei.	T20 The smallest separation between a charged projectile and a nucleus, reached when its kinetic energy has become electric potential energy.
T21 The emission of electrons from a material when it absorbs electromagnetic radiation of sufficiently high frequency.	T20 The whole number n that labels an electron's energy level.	T20 the spin storage I omega, conserved when no external torque acts
T21 The minimum energy needed to remove an electron from a material's surface.	T21 The minimum frequency of light that can release electrons from a given metal.	T21 An electron emitted from a surface when it absorbs a photon.

T21 stopping potential	T21 de Broglie wavelength	T21 wave–particle duality
T21 Compton scattering	T22 isotope	T22 strong nuclear force
T22 mass defect	T22 binding energy	T22 unified atomic mass unit

T21 The idea that matter and radiation show both wave and particle behaviour.	T21 The wavelength associated with a particle's momentum, equal to the Planck constant divided by that momentum.	T21 The potential difference that just stops the fastest photoelectrons from reaching the collector.
T22 The residual strong interaction that binds protons and neutrons together in nuclei.	T22 An atom of an element with the same proton number but a different neutron number from another atom of that element.	T21 The scattering of a photon by an electron, in which the photon loses energy and its wavelength increases.
T22 One twelfth of the mass of a carbon-12 atom, about 1.66×10^{-27} kg.	T22 The energy required to separate a bound system into specified free constituents.	T22 The difference between the total mass of a nucleus's separate nucleons and the mass of the nucleus.

T22 binding energy per nucleon	T22 fusion	T22 fission
T22 radioactive decay	T22 random	T22 spontaneous
T22 alpha particle	T22 antineutrino	T22 positron

T22 The splitting of a heavy nucleus into two lighter nuclei, with a release of energy.	T22 The joining of light nuclei to form a heavier nucleus, with a release of energy.	T22 A nucleus's total binding energy divided by its number of protons and neutrons.
T22 It occurs without a triggering collision. For the ordinary classroom decay model, its rate is approximately unaffected by temperature, pressure or chemical state.	T22 It is impossible to predict when a particular nucleus will decay.	T22 The spontaneous, random change of an unstable nucleus with the emission of radiation.
T22 The positively charged antiparticle of the electron, with the same mass.	T22 The very light, neutral antiparticle emitted with an electron in beta-minus decay.	T22 A helium-4 nucleus of two protons and two neutrons, emitted in alpha decay.

T22 neutrino	T22 gamma ray	T22 ionisation
T22 activity	T22 becquerel	T22 count rate
T22 half-life	T22 background radiation	T22 decay constant

T22 The removal or addition of electrons to an atom, leaving it charged.	T22 High-energy electromagnetic radiation emitted by an excited nucleus.	T22 An electrically neutral, very light elementary particle that interacts mainly through the weak interaction and gravity.
T22 The number of events registered by a detector per unit time.	T22 The SI unit of radioactive activity, equal to one nuclear decay per second.	T22 The number of nuclear decays per second in a radioactive sample, measured in becquerels.
T22 The probability per unit time that a nucleus decays, with symbol λ.	T22 Ionising radiation present in the surroundings from natural and artificial sources.	T22 The time for the number of undecayed nuclei in a radioactive sample to halve.

T23 nuclear fission	T23 fission fragment	T23 spontaneous fission
T23 neutron-induced fission	T23 chain reaction	T23 critical mass
T23 moderator	T23 control rod	T23 coolant

T23 Fission of a heavy nucleus that happens without an incoming particle.	T23 One of the two lighter nuclei produced when a heavy nucleus splits.	T23 The splitting of a heavy atomic nucleus into smaller nuclei, usually releasing energy and neutrons.
T23 The minimum amount of fissile material needed to sustain a nuclear chain reaction under specified conditions.	T23 A process in which products of one reaction trigger further reactions of the same kind, as neutrons can do in nuclear fission.	T23 Fission that starts when a nucleus absorbs a neutron.
T23 A fluid that carries thermal energy away from a reactor core or engine.	T23 A rod that absorbs neutrons in a reactor and so controls the rate of fission.	T23 A material in a reactor that slows fast neutrons so they are more likely to cause fission.

T23

heat exchanger

T23

shield

T23

nuclear waste

T24

gas pressure and
radiation pressure

T24

equilibrium

T24

nuclear fusion

T24

proton–proton chain

T24

positron

T24

neutrino

T23 Radioactive material left over from reactors and other nuclear processes.	T23 A barrier of absorbing material that protects against radiation.	T23 A device that transfers thermal energy between two fluids that do not mix.
T24 The joining of light atomic nuclei to form a heavier nucleus, releasing energy.	T24 A state with no resultant force or resultant moment.	T24 The two outward pressures in a star that balance the inward pull of gravity.
T24 An electrically neutral, very light elementary particle that interacts mainly through the weak interaction and gravity.	T24 The positively charged antiparticle of the electron, with the same mass.	T24 The series of fusion reactions by which Sun-like stars convert hydrogen into helium.

T24 Coulomb barrier	T24 quantum tunnelling	T24 astronomical unit
T24 light year	T24 parsec	T24 stellar parallax
T24 luminosity	T24 apparent brightness	T24 Hertzsprung–Russell diagram

T24 The mean distance between Earth and the Sun, about 1.5 $\times 10^{11}$ m.	T24 The passage of a particle through an energy barrier that it could not cross classically.	T24 The electrostatic repulsion that an incoming positive particle must overcome to reach a nucleus.
T24 The apparent shift of a nearby star against distant stars as Earth orbits the Sun.	T24 The distance at which a star has a parallax angle of one arcsecond, about 3.26 light years.	T24 The distance light travels in a vacuum in one year, about 9.46 $\times 10^{15}$ m.
T24 A plot of stellar luminosity against surface temperature.	T24 The power received from a star per unit area at the observer.	T24 The total energy a star or other source emits as radiation per unit time.

T24 main sequence	T24 red giant	T24 supergiant
T24 white dwarf	T24 instability strip	T24 nebula
T24 protostar	T24 planetary nebula	T24 supernova

T24 A very large, extremely luminous, massive star late in its life.	T24 A large, cool, luminous star that has exhausted the hydrogen in its core.	T24 The band on the Hertzsprung–Russell diagram containing stars that fuse hydrogen in their cores.
T24 A cloud of gas and dust in space.	T24 The region of the Hertzsprung–Russell diagram occupied by pulsating variable stars such as Cepheids.	T24 A dense, hot stellar remnant supported by electron degeneracy pressure, with no sustained core fusion.
T24 An extremely energetic stellar explosion, caused by the collapse of a massive star or runaway nuclear reactions in a white dwarf.	T24 The expanding shell of gas shed by a red giant at the end of its life.	T24 A collapsing cloud of gas that is heating up but has not yet started hydrogen fusion.

T24 neutron star	T24 black hole	T25 uncertainty
T25 random error	T25 systematic error	T25 zero error
T25 accurate	T25 precise	T25 uncertainty bar

T25 An estimate of the possible range of error in a measurement.	T24 A region of spacetime where gravity is so strong that nothing, not even light, can escape.	T24 The very dense remnant of a supernova, composed mostly of neutrons.
T25 An instrument reading that is nonzero when the true quantity is zero.	T25 A consistent measurement bias caused by the method or instrument.	T25 Unpredictable variation between repeated measurements.
T25 A line through a plotted point showing the uncertainty range of that measurement.	T25 Giving closely grouped repeated readings, with little random variation.	T25 Close to the true value.

T25 outlier	T25 gradient	T25 intercept
T25 linearise	T25 research question	T25 independent variable
T25 dependent variable	T25 control variable	

T25 The coordinate at which a graph crosses a specified coordinate axis.	T25 The change in the vertical coordinate divided by the change in the horizontal coordinate.	T25 An observation unusually far from the rest of the data or from the pattern expected under a model.
T25 An input or factor whose value is chosen or varied to examine its effect on another quantity.	T25 The specific question an investigation is designed to answer.	T25 To transform variables so that a relationship plots as a straight line.
	T25 A factor kept constant or otherwise accounted for so its effect does not distort an investigation.	T25 The measured or calculated outcome whose response to changes in another variable is studied.