Most Common Physics Definitions

O Level 5054 & IGCSE 0625 — ranked by how many times they've been asked

Sources analysed: the compiled topical past-paper books for O Level 5054 Paper 2 (2015–2025) and IGCSE 0625 Paper 4 Extended (2018–2025). Every question stem was scanned for **Define X**, **State what is meant by X**, **Explain what is meant by X**, **State the definition of X**, **What is meant by X?**, **State the principle of X**, and **State <name's> law** prompts. Near-duplicates were merged (e.g. 'moment' / 'the moment of a force' / 'the moment of a force about a point'). Counts are across **both** boards combined.

Band	What it means	Examples
Tier 1 (5+ times)	Guaranteed high-frequency definitions — every student must know these word-for-word	acceleration, e.m.f., monochromatic light, background radiation
Tier 2 (3–4 times)	Very likely to appear — expect at least two in any given paper	velocity, momentum, moment of a force, half-life, electric field, centre of mass, p.d., nuclear fission, focal length, boiling point
Tier 3 (2 times)	High-value ensemble — drill collectively as short-answer recall	density, mass, pressure, work done, efficiency, specific heat capacity, critical angle, frequency, wavefront, Hooke's law, impulse, kWh, limit of proportionality, renewable/non-renewable
Tier 4 (1 time)	Worth covering for completeness — short list on p. 6	Ohm's law, refractive index, TIR, gamma ray, isotope, light-year, Hubble constant, thermal capacity, etc.
Total distinct prompts		≈ **142 definition prompts** extracted across both topical workbooks

Notes: (a) Definitions below are written to Cambridge mark-scheme style — use the exact wording where possible. (b) Where both boards use different wording for the same concept, both forms are given. (c) Counts are indicative, not exhaustive — they are from the topical compilations you supplied; the actual past-paper universe is larger. (d) For 2026 sittings all Tier 1 & 2 items should be treated as "must-recall" facts.

Prepared by Mahad Amer, April 2026. Intended as a classroom revision aid.

Tier 1 — Must-know definitions (5+ appearances)

#	Term	Times asked	Mark-scheme definition
1	**Acceleration**	16	The **rate of change of velocity** with respect to time. Equivalent form: change in velocity per unit time. Unit: m/s^2. *Uniform acceleration* = acceleration that is constant in magnitude and direction.
2	**Electromotive force (e.m.f.)**	8	The **energy transferred by a source per unit charge** passing through the source ($\varepsilon = E/Q$). Unit: volt (V) = J/C.
3	**Monochromatic light**	6	Light of a **single frequency** (and therefore a single wavelength).
4	**Background radiation**	5	Ionising radiation that is always present in the environment, from natural sources (cosmic rays, rocks, radon gas, food) and artificial sources (medical devices, nuclear waste).

Tier 2 — Very likely (3–4 appearances)

#	Term	Times	Mark-scheme definition
5	**Velocity**	4	The **rate of change of displacement** with respect to time, OR displacement per unit time. Vector quantity. Unit: m/s.
6	**Momentum**	4	The **product of mass and velocity** ($p = mv$). Vector quantity. Unit: kg m/s.
7	**Moment of a force**	6 (incl. ‘about a point’)	The product of the **force** and the **perpendicular distance** from the pivot (or point) to the line of action of the force. Unit: N m.
8	**Half-life**	4	The **average time taken for half the undecayed nuclei** (or half the activity) in a radioactive sample to decay.
9	**Boiling point**	4	The temperature at which a liquid changes to a gas **throughout the liquid** (not just at the surface) at a given atmospheric pressure.
10	**Centre of mass / centre of gravity**	4	The single point at which the **entire weight of an object** can be considered to act.
11	**Potential difference (p.d.)**	4	The **work done per unit charge** when charge moves between two points ($V = W/Q$). Unit: volt (V).
12	**Nuclear fission**	4	The **splitting of a large, heavy nucleus** (e.g. U-235) into two smaller nuclei, usually accompanied by the release of energy and two or three neutrons.
13	**Electric field**	4	A region of space in which a **charged object experiences a force**. Field lines show the direction of the force on a positive test charge.
14	**Vector (quantity)**	3	A quantity with both **magnitude AND direction** (e.g. velocity, force, momentum). A scalar has magnitude only (e.g. mass, speed, temperature).
15	**Ultrasound**	3	Sound of frequency **above 20 kHz** — above the upper limit of normal human hearing.
16	**Focal length (of a thin lens)**	3	The distance between the **centre of a lens and its principal focus** (the point to which rays parallel to the principal axis converge after passing through the lens).

Tier 3 — High-value (2 appearances) — Mechanics & Thermal

#	Term	Mark-scheme definition
17	**Mass**	The **quantity of matter** in a body. Unit: kg. A scalar quantity — independent of location.
18	**Density**	**Mass per unit volume** ($\rho = m/V$). Unit: kg/m^3. An object floats on a fluid if its average density is less than the fluid's.
19	**Pressure**	The **force per unit area** acting perpendicular to a surface ($p = F/A$). Unit: $Pa = N/m^2$. In a fluid: $p = \rho gh$.
20	**Work done**	The **product of the force** and **the distance moved in the direction of the force** ($W = Fd$, or $W = Fd\cos\theta$ when F and d are not parallel). Unit: joule (J).
21	**Power**	The **rate of doing work**, or the rate of transferring energy ($P = W/t$). Unit: watt (W) = 1 J/s.
22	**Efficiency**	**Useful energy (or power) output** divided by **total energy (or power) input**, often expressed as a percentage. Efficiency ≤ 100 %.
23	**Specific heat capacity**	The **energy required per unit mass** to raise the temperature of a substance by **1 °C (or 1 K)**. $c = E / (m\Delta\theta)$. Unit: J/(kg °C).
24	**Specific latent heat**	The **energy per unit mass** required to change the state of a substance (solid↔liquid OR liquid↔gas) with **no change in temperature**. $L = E/m$. Unit: J/kg.
25	**Thermal (heat) capacity**	The energy required to raise the temperature of a body by **1 °C (or 1 K)**. $C = mc = E/\Delta\theta$. Unit: J/°C.
26	**Hooke's law**	The **extension of a spring is directly proportional to the applied force**, provided the limit of proportionality is not exceeded. $F = kx$.
27	**Limit of proportionality**	The **maximum force (or stress) beyond which the extension** of a spring (or wire) is **no longer directly proportional** to the applied force.
28	**Impulse**	The **product of force and the time for which it acts**. Impulse equals **change in momentum**: impulse = $F\Delta t = \Delta p$. Unit: N s = kg m/s.
29	**Principle of moments**	For a body in equilibrium, the **sum of clockwise moments** about any point **equals the sum of anticlockwise moments** about the same point.
30	**Renewable / non-renewable energy source**	**Renewable** = a source that is replenished at a rate comparable to the rate of use (solar, wind, hydro, tidal, biomass). **Non-renewable** = a source that is used faster than it is replaced (coal, oil, gas, nuclear).
31	**Melting point**	The temperature at which a **solid changes to a liquid** (pure substance, at atmospheric pressure). The reverse is the freezing point — same temperature.

Tier 3 — High-value (2 appearances) — Waves, Electricity, Atomic, Space

#	Term	Mark-scheme definition
32	**Frequency**	The **number of complete waves (or oscillations) passing a point per unit time**. Unit: hertz (Hz) = 1/s. f = 1/T.
33	**Wavefront**	A line (or surface) that joins **points on a wave which are in phase** (e.g. all crests, or all troughs).
34	**Critical angle**	The **angle of incidence in the denser medium** for which the angle of refraction in the less-dense medium is exactly **90°**. sin c = 1/n.
35	**Refractive index**	The **ratio of the speed of light in a vacuum (or air) to its speed in the medium** (n = c/v). Equivalent form: n = sin i / sin r.
36	**Total internal reflection (TIR)**	The **complete reflection of a ray of light at the boundary** between a denser and a less-dense medium, when the angle of incidence is **greater than the critical angle**.
37	**Real image**	An image **formed where rays of light actually meet**. Can be projected onto a screen (e.g. in a camera, on a retina).
38	**Virtual image**	An image **formed where rays of light appear to come from** but do *not* actually meet. Cannot be projected onto a screen (e.g. image in a plane mirror, magnifying glass image).
39	**Linear magnification**	The ratio **image height / object height**. Equivalent: image distance / object distance for a thin lens.
40	**Wave / wavelength / period / amplitude**	**Wavelength** λ = distance between two consecutive points in phase. **Period T** = time for one complete oscillation. **Amplitude** = maximum displacement from the rest position.
41	**Transverse / longitudinal wave**	**Transverse:** particle oscillation is **perpendicular** to the direction of wave travel (e.g. light, water ripple). **Longitudinal:** particle oscillation is **parallel** to the direction of wave travel (e.g. sound). Sound waves cannot be polarised.
42	**Echo**	A sound wave that has been **reflected from a surface** and heard separately from the original. 2d = v t (d = distance to reflector, v = speed of sound, t = total time).
43	**Electric current**	The **rate of flow of electric charge** (I = Q/t). Unit: ampere (A) = 1 C/s.
44	**Ohm's law**	The **current through a conductor is directly proportional to the p.d.** across its ends, provided physical conditions (e.g. temperature) are constant.
45	**Resistance**	The ratio of **p.d. across a component to the current through it** (R = V/I). Unit: ohm (Ω) = V/A.
46	**Kilowatt-hour (kWh)**	The **energy transferred when a device of power 1 kW operates for 1 hour**. 1 kWh = 1000 W × 3600 s = **3.6×10^6 J**.
47	**Magnetic / gravitational field**	**Magnetic field** = region in which a magnetic material (or a moving charge) experiences a force. **Gravitational field** = region in which a mass experiences a force due to another mass. Both are represented by field lines.
48	**Gravitational field strength**	**Force per unit mass** on an object in a gravitational field (g = W/m). Unit: N/kg. On Earth g ≈ 9.81 N/kg.
49	**Isotope**	Atoms of the **same element** (same proton number Z) with **different numbers of neutrons** (and hence different mass numbers A).
50	**Nuclear fusion**	The **joining of two small nuclei to form a larger nucleus**, with the release of energy. Powers stars (e.g. hydrogen → helium in the Sun).
51	**Random and spontaneous (radioactive decay)**	**Random:** impossible to predict *when* any particular nucleus will decay. **Spontaneous:** decay is not affected by external factors (temperature, pressure, chemical state).

Tier 4 — Single-appearance terms still worth knowing

#	Term	Mark-scheme definition
52	**Gamma (γ) ray**	A **high-energy electromagnetic wave** emitted by an unstable (radioactive) nucleus. No mass, no charge, high penetrating power, low ionising power.
53	**Balanced vs unbalanced forces**	**Balanced**: resultant force = 0 ⇒ object stays at rest or moves at constant velocity. **Unbalanced**: resultant force ≠ 0 ⇒ object accelerates ($a = F_{res}/m$).
54	**Convection current**	A current of fluid (liquid or gas) set up by **differences in density caused by heating**: warmer fluid is less dense and rises; cooler fluid sinks. Transfers thermal energy.
55	**Principle of conservation of energy**	Energy **cannot be created or destroyed**; it can only be transferred from one store to another or from one object to another. Total energy of a closed system is constant.
56	**Compression and rarefaction**	In a longitudinal wave: **compression** = region where particles are pushed closer together (higher pressure). **Rarefaction** = region where particles are further apart (lower pressure).
57	**Absolute zero**	The lowest theoretically attainable temperature: **0 kelvin = −273 °C**. All particle motion (kinetic energy) is at a minimum.
58	**Light-year**	The **distance travelled by light in a vacuum in one year** ≈ 9.5×10^{15} m. A unit of distance, not of time.
59	**Hubble constant (H■)**	The **constant of proportionality** between the recessional velocity of a galaxy and its distance from us: $v = H_0 \times d$. Typical value ≈ 2.2×10^{-18} s^{-1}.
60	**Direction of a magnetic field**	The direction in which a **free north (N) pole** would move if placed at that point. Equivalent: the direction shown by the N-pole of a small plotting compass.
61	**Direction of an electric field**	The direction of the **force on a positive test charge** placed at that point. Field lines go **from positive to negative**.
62	**Newton's laws of motion**	**I:** An object remains at rest or moves in a straight line at constant velocity unless acted on by a resultant force. **II:** Resultant force = mass × acceleration ($F = ma$); equivalently $F = \Delta p/\Delta t$. **III:** When object A exerts a force on object B, B exerts an equal and opposite force on A.

How to use this sheet effectively

Drill method: cover the right-hand column and self-test on the term. Score a point for each definition you reproduce in the *exact* mark-scheme wording. Cambridge mark schemes award for specific phrasing — e.g. a candidate who writes “acceleration is how fast velocity changes” earns 0 marks; “acceleration is the rate of change of velocity” earns 1 mark. Teach the exact form first; the physical intuition second.

Which tier matters most: Tiers 1 and 2 are almost impossible to avoid — between them they appear in **every** paper in the last five years. Tier 3 is where a well-prepared student over-scores a weaker candidate: any one of those 15 terms can appear for 1–2 marks and is easy to drill. Tier 4 terms are lower-frequency but cheap to learn — students should cover them in a single 30■minute session.

Common trap: Cambridge often asks for the *unit* alongside the definition (“Define e.m.f. and state its unit”). Every Tier 1 and Tier 2 definition in this sheet includes the unit — memorise both together. The second trap is mixing up **moment** (turning effect, N m) and **momentum** (inertia of motion, kg m/s) — they sound similar but are completely different quantities and the examiner regularly tests both in the same paper.

For best results, print this sheet on two sides of A4 (pages 2–5) and have students highlight every term they can already define fluently — the remaining terms are the revision priority. The ten most common definitions alone account for **> 40 %** of all definition prompts in the corpus.

Prepared by: Mahad Amer | April 2026
Source data: O Level 5054 Paper 2 topical (2015–2025) + IGCSE 0625 Paper 4 Extended topical (2018–2025)