IGCSE Physics 0625 — Paper 1 (Core) MCQ Survival Guide

Where Cambridge students drop marks, and the technique that gets them back.

Built from every Paper 1 examiner report 2021–2025 (Core variants 0625/11, /12, /13). Brought to you by CIE Insider.

How to use this guide

This is not another revision summary. It is a map of the **exact mistakes** Cambridge examiners flag every single series. If you know these traps and the technique to avoid them, you can pick up 3–6 easy marks that most candidates throw away.

Read it once a fortnight out from your exam. Then again the night before. Then look at the last-week checklist on the morning of the paper.

The paper at a glance

- **40 multiple-choice questions, 45 minutes** — that is **just over 1 minute per question**.
- Four options (A, B, C, D). One correct answer. No negative marking, so **never leave a blank**.
- Variants 11, 12 and 13 sit in the same series. The traps repeat across variants — examiners flag the SAME misconception in two or three variants every series.
- Topics are spread roughly: Motion & Forces, Thermal Physics, Waves & Optics, Electricity & Magnetism, Atomic Physics & Space — with Measurement woven through.

What examiners actually want: you **read the question, do the physics, and choose**. Their #1 complaint across every single series is candidates who **read the options first** and back-fit the maths.

The Top 10 Mistakes That Cost Core Candidates Marks

Ranked by how often examiners flag them across the 15 series of reports analysed. If you fix only these ten, you will outscore most of the cohort.

1. Free-fall acceleration is **constant** — not increasing as the object falls

> Flagged in: Jun 2021, Mar 2022, Nov 2024, Jun 2025 (recurring).

In free fall (no air resistance), every object accelerates at **g = 9.8 m/s²** (or 10 m/s² if the question rounds). It does **not** speed up faster as it falls. Heavier objects do **not** fall faster than lighter ones.

The fix: If a question shows two balls of different mass dropped together, the answer almost always involves them landing at the same time. If it asks about acceleration during a fall, the answer is "constant".

2. Distance from a speed–time graph = **area under the curve**

> `Flagged in: Jun 2021, Nov 2022, Jun 2023, Nov 2025.`

`d = v × t` only works when speed is constant. On a non-uniform speed-time graph, **distance = area under the line**. Split it into rectangles and triangles, add them up.

Common wrong move: Multiplying the final speed by the final time. That is just the area of one big rectangle, not the actual area.

Also: **deceleration = gradient** of a speed-time graph, **not area**. Flagged Nov 2025.

3. Half-life is read from where the curve drops to **half its starting value** — not "half the time on the x-axis"

> `Flagged in: Jun 2021, Nov 2021, Jun 2022, Nov 2025.`

Look at the count rate (or activity, or mass) on the y-axis. Find half of the **starting** value. Then drop down to the time axis. That time is one half-life.

Watch out for half-life puzzles like "the count dropped to 1/8 — what time did it take?" That is **3 half-lives** (½ → ¼ → ⅛), so 3 × the half-life. Do **not** divide total time by 8.

4. Parallel resistors give a total resistance **smaller than either resistor** — never the average

> `Flagged in: Nov 2021 (all three variants), Nov 2023, persistent through 2025.`

Two resistors in parallel give a charge carrier a choice of paths, so more current can flow → lower total resistance. The total is always less than the smaller of the two values.

Common wrong move: Adding two values then dividing by 2 (averaging). That gives a number bigger than the smaller resistor, which is impossible for parallel.

5. "NOT", "EXCEPT", "ONLY" — read every question twice

> `Flagged in every single series 2021–2025.`

When a question asks "Which is **NOT** correct?" or "Which is **EXCEPT**...", candidates pick the first true statement they see. Underline the negation word the moment you see it.

The habit to build: Before you look at options A–D, say out loud (or in your head) what kind of answer you are looking for — "the wrong one", "the bigger one", "the longest wavelength".

6. Unit conversions — minutes to seconds is the #1 unit error

> Flagged in: Jun 2021, Jun 2023, Nov 2023, Jun 2024, Nov 2024, Mar 2025 (every single year).

If a time is given in **minutes** and the equation needs **seconds**, multiply by 60 first. Examiners specifically flag this for `E = Pt`, `Q = It`, and average speed calculations.

Other repeat offenders:

- **mA → A**: divide by 1000 (or × 10^{-3}). Working in mA in `R = V/I` gives **kilo-ohms**, not ohms.
- **mm → m**: divide by 1000.
- **cm³ → m³**: divide by 1,000,000.
- **kW → W**: multiply by 1000.

7. Current is the **same everywhere** in a series circuit — it is not "used up"

> Flagged in: Nov 2024 (P11 Q29), persistent.

Charge is conserved. The ammeter at the end of the circuit reads the same value as the ammeter at the start. Current splits at parallel junctions; it does **not** get smaller as it passes through a lamp.

8. Image in a plane mirror = **virtual**, same size, as far behind as object is in front

> Flagged in: Nov 2022 (all three variants), Mar 2024, Mar 2025.

Three things that get marked wrong:

- "Real" instead of virtual.
- "Inverted" (upside down) — it's actually **laterally** inverted (left-right swap).
- "In the plane of the mirror" — no, behind the mirror.

9. Free-body / weight vs mass — weight is a **force in newtons**, mass is in **kilograms**

> Flagged in: Nov 2023, Jun 2024, Jun 2025, Nov 2025.

- **Mass** = how much matter the object contains. Unit: kg. Measured with a balance.
- **Weight** = the gravitational force on the object. Unit: N. `W = m × g`. Measured with a force-meter (spring balance) even when the scale is labelled in kg.

`g` (gravitational field strength) = force per unit mass, N/kg. It is **not** equal to weight.

10. Half the time / double the time — there-and-back problems

> Flagged in: Mar 2024 (echo), Jun 2024 (light-year), Nov 2024 (echo).

When something **travels out and comes back** (echo, radar pulse, sonar), the time given is for the **round trip**. To get the one-way distance, **halve the time** before applying `d = v × t`. Or

apply `v × t` then **halve the answer**.

Conversely, if the time is one-way and the question asks how long until the signal returns: **double it**.

Topic-by-topic pitfalls

Motion, Forces and Pressure

- **Average speed = total distance ÷ total time.** Not the average of two different speeds.
- **Constant velocity → zero resultant force.** Even when the object is moving. Even when it is moving downhill. This catches candidates every series (Jun 2025 P12 Q6).
- **Equilibrium needs both:** zero resultant force AND zero resultant moment. Don't stop at one.
- **Moment = F × perpendicular distance** (turning effect, units N·m). Don't confuse with work done = F × distance moved (units J, energy transfer).
- **Pressure = force ÷ area** (force per area, units Pa or N/m²). It is **not** force × area, and it is **not** force ÷ volume.
- **Atmospheric pressure problems:** if the question gives you a change in pressure (Δp), the pressure at the top of the hill = atmospheric – Δp. Don't stop at Δp alone.
- **To compare floating objects, compare densities — not masses.** A solid floats on a liquid if its density is less than the liquid's density (Nov 2025 P11 Q4).

Thermal Physics and Kinetic Theory

- **Temperature does NOT change during melting or boiling.** Energy goes into breaking bonds, not raising temperature.
- **Mass is conserved.** Steam mass = mass of water that boiled away. They are equal.
- **Evaporation COOLS the remaining liquid.** The fastest molecules escape, so the average kinetic energy (i.e. temperature) of those left behind drops.
- **At constant temperature, particle speed doesn't change.** Compressing a gas at constant T → spacing decreases, but speed (and KE) stays the same.
- **Kelvin = °C + 273.** So 0 °C = 273 K, 100 °C = 373 K (not 273 K — flagged Mar 2024). Absolute zero = –273 °C = 0 K.
- **Thermal radiation travels through vacuum.** That is how the Sun's heat reaches Earth.
- **Dull/black surfaces** are the best **emitters AND absorbers** of thermal radiation. Shiny/white surfaces are poor at both.
- **Brownian motion** is random because of **molecular bombardment** by invisible air molecules — not because of density differences.

Waves, Sound and Optics

- **Sound is a longitudinal wave.** Including ultrasound. Examiners flag "transverse" answers every series.
- **P-waves = longitudinal. S-waves = transverse.** Memorise the pairing.
- **All electromagnetic waves travel at the same speed in vacuum** (3×10^8 m/s). Different in matter, but in vacuum, identical.
- **EM spectrum order** (longest → shortest wavelength): radio, microwave, infrared, visible (ROYGBIV), ultraviolet, X-ray, gamma. Higher frequency = shorter wavelength = more energy.
- **ROYGBIV runs from longest λ (red) to shortest λ (violet)** — equivalently, lowest f (red) to highest f (violet).
- **Refraction changes speed and wavelength.** Frequency does **NOT** change when light enters a new medium.
- **Total internal reflection** needs angle of incidence > critical angle. Above the critical angle there is **NO** refracted ray — all the light reflects back.
- **All angles in optics are measured from the normal** (the perpendicular dashed line), not from the surface.
- **Echo / radar / sonar** = there-and-back. Halve or double appropriately.
- **Wavefront** is perpendicular to the direction of wave travel — not parallel to it.

Electricity and Magnetism

- **Resistance = V ÷ I** (potential difference divided by current). Not the gradient of an I-V graph for a non-linear component.
- **Ohmic conductor** at constant temperature: $I \propto V$, so V/I is constant.
- **Filament lamp**: as current rises, the filament heats up → resistance rises → I-V graph curves over (current rises more slowly).
- **Diode** lets current flow one way only.
- **Thermistor**: resistance **decreases** as temperature increases. So in a series circuit, hotter thermistor → less resistance → more current.
- **In a series circuit, current is the same everywhere.** PD adds up.
- **In a parallel circuit, PD is the same across each branch.** Currents add up.
- **Fuse rating:** choose the rating **just above** the operating current. Not the closest value (which might be below).
- **A fuse goes in the live wire, and so does the switch** (not the neutral).
- **Double-insulated appliances** don't need an earth wire.
- **EMF is induced** when a magnetic field through a coil **changes** — by moving a conductor through a field, or moving a magnet near a coil. Faster movement = larger induced EMF.

- **Transformers need alternating current.** A DC supply produces no changing flux, so no induction.
- **Field lines around a bar magnet go N → S outside the magnet.**
- **Right-hand grip rule** for the field around a straight wire: thumb in direction of conventional current, fingers curl in direction of field.

Atomic Physics and Radioactivity

- **The nucleus decays, not the atom.** Decay is a nuclear process.
- **Alpha (α)** = helium nucleus (2p + 2n). Stopped by paper or a few cm of air. Most ionising.
- **Beta (β^-)** = high-energy electron from the nucleus (a neutron turns into a proton + electron). Stopped by a few mm of aluminium.
- **Gamma (γ)** = high-frequency EM wave. Most penetrating — stopped only by thick lead/concrete. Least ionising.
- **Beta decay changes the element** (proton number goes up by 1). Alpha changes it too (proton number drops by 2).
- **Half-life** = time for half of a radioactive sample to decay. If it falls to ¼, that's **two** half-lives.
- **Background radiation** is always present, even with no source. Includes cosmic rays, radon gas, food, soil. Does **NOT** include radio/TV (non-ionising).
- **Radioactive decay is random.** No pattern, no rule about which nucleus decays next.

Space and Cosmology

- **The Sun is powered by nuclear fusion** (hydrogen → helium). Nuclear fission is in power stations.
- **Order of planets from the Sun:** Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.
- **Star lifecycle (low-mass):** protostar → main sequence → red giant → white dwarf.
- **Star lifecycle (high-mass):** protostar → main sequence → red supergiant → supernova → neutron star or black hole.
- **Redshift** = light from a galaxy moving away has its wavelength stretched (longer λ, lower f).
- **1 light-year** ≈ 9.5×10^{15} **metres** (not km).

Universal MCQ technique

These rules apply to **every question**, every series.

1. Cover the options. Solve the question first.

Examiners say this in every report. If you read A–D first, your brain anchors to the values shown and you start back-fitting. Solve cleanly, then look.

2. Eliminate two, then choose.

If you cannot fully solve, eliminate any options you can prove are wrong. Even getting down to two doubles your odds — and often the third elimination is easier from there.

3. Always write down the equation before substituting.

Saying "ρ = m/V" out loud (or on the question paper) stops you putting the numbers in upside down.

4. Unit check, every time.

Look at what units the answer should be in. If you're calculating energy and your numbers are giving you watts, something has gone wrong.

5. Sanity check the magnitude.

The mass of an adult is about 60–80 kg, not 6 kg or 600 kg. The speed of sound in air is about 340 m/s, not 34 or 3400. A reasonable-sized number doesn't prove you're right, but a wildly unreasonable number proves you're wrong.

6. Don't leave blanks.

No negative marking. If you're truly stuck, guess. But guess smart — eliminate first.

7. Watch for command words.

- **"Which of the following is NOT…"** — looking for the false statement.
- **"Which of the following EXCEPT…"** — looking for the odd one out.
- **"Which ONLY shows…"** — looking for the exclusive case.
- **"Which is the BEST…"** — multiple may be partly right; pick the most complete.

8. Don't get sucked into trial-and-error from the options.

Examiners specifically warn that strong candidates calculate first; weak candidates plug option values into equations and check. The second method gives you a 1 in 4 chance and wastes time.

The trap-spotter — distractor patterns

Knowing how examiners build the wrong answers is half the game. Here are the common patterns.

PATTERN	HOW IT LOOKS	HOW TO BEAT IT
Inverted formula	Option uses V/I instead of I/V, or m/ρ instead of ρ/m	Write the equation symbolically before substituting
Missed unit conversion	One option is 60× too big or 1000× too small	Convert everything to SI before substituting
Forgot half / double	Echo problems: option D is the right number but for a one-way trip	Always check "there-and-back" before finalising
Right number, wrong unit	The mantissa is correct but the unit is g instead of kg, or km instead of m	Read the unit on each option as carefully as the number
Used the average instead of the difference	E.g. weight – upthrust questions: option uses sum, not difference	Sketch the forces; identify direction of each
Right physics, wrong column	Two-column options (e.g. transverse/longitudinal vs frequency higher/lower) — got one right, one wrong	Verify BOTH columns before circling
Ignored a 'minor' factor	Background count not subtracted; pivot reaction force ignored; upthrust not included in equilibrium	List ALL forces / contributions explicitly
Reverse direction	Force on electron in field is opposite to field direction	Note charge sign before applying the rule

Last-week checklist

Two weeks before the exam, work through this list. Tick each one when you can do it cold.

Quantities and units

- [ ] Mass (kg) vs weight (N) — and `W = mg`
- [ ] Density (`ρ = m/V` , kg/m³) — and `m = ρV` rearrangements
- [ ] Pressure (`p = F/A` , Pa) — and pressure in liquids `p = ρgh`
- [ ] Convert min → s, hr → s, mm → m, cm³ → m³, mA → A, kW → W

Motion

- [ ] Speed–time graph: area = distance; gradient = acceleration
- [ ] Distance–time graph: gradient = speed
- [ ] Free-fall acceleration is constant
- [ ] Average speed = total distance ÷ total time

Forces and energy

- [ ] Equilibrium = zero resultant force AND zero resultant moment
- [ ] Moment = F × perpendicular distance
- [ ] Work done = F × distance in direction of force
- [ ] `E = Pt` ; convert time to seconds
- [ ] On a horizontal surface, KE can only convert to thermal (not GPE)

Thermal

- [ ] Change of state = temperature constant
- [ ] Kelvin = °C + 273
- [ ] Evaporation cools the remaining liquid
- [ ] Dull black = best emitter/absorber of thermal radiation

Waves

- [ ] All EM waves travel at same speed in vacuum
- [ ] EM order longest λ → shortest λ
- [ ] Sound = longitudinal
- [ ] Angles measured from the normal
- [ ] TIR above critical angle → no refracted ray
- [ ] Echo: halve the time before applying `d = vt`

Electricity

- [ ] Resistance = V/I
- [ ] Series: current same, PD adds
- [ ] Parallel: PD same, currents add, total R < smallest R
- [ ] Thermistor: T ↑ → R ↓; LDR: light ↑ → R ↓
- [ ] Fuse rating just above operating current
- [ ] Transformer needs a.c.

Atomic

- [ ] Alpha = He nucleus; beta = electron from nucleus; gamma = EM wave
- [ ] Half-life rule: ½, ¼, ⅛ at 1, 2, 3 half-lives
- [ ] Background radiation = always present, ionising sources only
- [ ] Decay is random

Exam day habits

- [ ] Cover the options, solve first
- [ ] Underline NOT / EXCEPT / ONLY

- [ ] Write equation before substituting
- [ ] Eliminate two before choosing
- [ ] Never leave a blank

Worked example

Question: A radioactive source has an initial count rate of 580 counts/min above background. The background count rate is 20 counts/min. The half-life of the source is 6 hours.

What is the **total measured count rate** (including background) after 18 hours?

A. 72 counts/min B. 92 counts/min C. 145 counts/min D. 165 counts/min

Solving cleanly (cover the options first):

Step 1 — what is asked? **Total measured count rate after 18 hours** (so we will need to add background back at the end).

Step 2 — how many half-lives? 18 ÷ 6 = **3 half-lives**.

Step 3 — apply half-lives to the **source** count rate (the 580 figure is already above background, so it's the source rate). After 3 half-lives: 580 → 290 → 145 → **72.5 counts/min**.

Step 4 — add background back: 72.5 + 20 = **92.5 counts/min**.

Step 5 — match to options: **B (92 counts/min).**

Why each wrong option exists:

- **A (72)** = forgot to add background back at the end. Common error.
- **C (145)** = stopped at 2 half-lives instead of 3. Mis-counting.
- **D (165)** = added the FULL initial count's background back without applying half-lives correctly.

The trap was step 4 (adding background back) — flagged in Nov 2021, Jun 2023, Jun 2024 and Jun 2025. If you stopped at 72, your physics was right but you missed what the question asked for.

A final word

Most candidates who underperform on this paper do so because of **technique**, not physics. They knew the content. They just rushed, mis-read, skipped units, or guessed when they could have eliminated.

Use this guide. Slow down on questions 1, 3 and 11 — the ones where examiners say "weaker candidates went straight for the answer". Read every "NOT". Convert every unit.

You've got this.

— CIE INSIDER