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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Motion (Kinematics) — Paper 1

Worked Answer Key (Multiple Choice)

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Motion (Kinematics) — Paper 1 · Worked Answer Key

These are **Megalecture worked answers** for the topical multiple-choice compilation on **Motion / Kinematics (IGCSE Physics 0625, Paper 1)**. Every answer below was solved from first principles by the Megalecture team; calculations use only the data given in each question (with *g* = 10 m/s² for free-fall items). Use this key to mark your work and to see the one-line reasoning behind each correct letter. The compilation is organised into three sections — keep your eye on the section heading, as the question numbering restarts in each section. For graph items, the key states exactly which gradient or area was read.

Section A · Speed, Velocity and Acceleration

Q #	Exam reference	Answer	Brief working / reason
A1	Cambridge 0625 · P1	**A**	Velocity uses the straight-line displacement X → Z = 2.4 km (not the path length). Total time = 20 + 10 (rest) + 10 = 40 min. Average velocity = 2.4 / 40 = **0.060 km/minute**.
A2	Cambridge 0625 · P1	**D**	a = (v − u) / t = (12 − 8) / 6.0. Change in speed over time taken → expression **(12 − 8) / 6**.
A3	Cambridge 0625 · P1	**B**	Two cameras a known distance apart record the times the vehicle passes each. Distance ÷ time between them gives the **average speed of the vehicle** over that section (not acceleration or maximum values).
A4	Cambridge 0625 · P1	**A**	Constant acceleration = equal speed increase each second. Per-second steps: A 0 → 1.0 → 3.0 → 6.0 = +1.0, +2.0, +3.0 (**not constant**); B 0 → 2.0 → 4.0 → 6.0 = +2.0 each; C 0 → 3.0 → 6.0 → 9.0 = +3.0 each; D 5.5 → 6.5 → 7.5 → 8.5 = +1.0 each. Only body **A** has changing steps.
A5	Cambridge 0625 · P1	**A**	As the car speeds up its velocity is rising (velocity changes) and it has a non-zero acceleration that then drops to zero at constant speed (acceleration changes). During the journey **both the acceleration and the velocity change**.

Section B · Graphical Analysis of Motion

Q #	Exam reference	Answer	Brief working / reason
B1	Cambridge 0625 · P1	**D**	On a speed–time graph, acceleration = gradient. Between 10 s and 20 s the line is horizontal at 15 m/s, so gradient = 0 → **the acceleration is zero**.
B2	Cambridge 0625 · P1	**C**	A straight distance–time line through O means constant speed (constant gradient > 0). Constant speed → constant, non-zero

Q #	Exam reference	Answer	Brief working / reason
			kinetic energy. (GPE rises as it climbs, acceleration is zero, resultant force is zero.)
B3	Cambridge 0625 · P1	A	Resultant force falls linearly to zero at t_0, so acceleration (= gradient of speed) falls to zero. Speed keeps rising but ever more slowly, levelling off at t_0 → the rise-and-flatten curve, graph **A**.
B4	Cambridge 0625 · P1	C	Distance = area under speed–time graph. Uniform rise 0→6.0 m/s over 4.0 s: area = ½ × 4.0 × 6.0 = **12 m**.
B5	Cambridge 0625 · P1	D	A train making a short stop: speed falls to zero, stays briefly at zero, then rises again. The graph that dips to zero and back up (V-shape with a flat bottom) is graph **D**.
B6	Cambridge 0625 · P1	D	The distance–time curve rises then flattens to horizontal → the object slows and stops (speed → 0, distance constant). That matches **a train braking to a halt as it stops at a station**.
B7	Cambridge 0625 · P1	C	Greatest speed = highest point of the speed–time graph = the flat top at 3 m/s → **3 m/s**.
B8	Cambridge 0625 · P1	C	Constant acceleration from rest → distance ∝ time², so the curve has increasing gradient and starts at O. This needs **time on the x-axis and distance on the y-axis** → row **C**.
B9	Cambridge 0625 · P1	C	On a distance–time graph, deceleration is where the gradient (speed) is decreasing — the curve bending over toward horizontal. That is region **C** (just before the flat section D).
B10	Cambridge 0625 · P1	A	Speed rises uniformly (constant acceleration from rest), so distance ∝ time². The matching distance–time graph is the upward-curving parabola from O → graph **A**.
B11	Cambridge 0625 · P1	B	Area under speed–time graph. First 20 s at 10 m/s = 200 m. Next 10 s, 10→20 m/s (trapezium) = ½(10 + 20) × 10 = 150 m. Total = 200 + 150 = **350 m**.
B12	Cambridge 0625 · P1	B	Average speed = total distance ÷ total time = 300 m ÷ 250 s = **1.2 m/s**.
B13	Cambridge 0625 · P1	D	Between 10 s and 20 s the speed is constant at 15 m/s (horizontal line), so gradient = acceleration = 0 → **the acceleration is zero**.
B14	Cambridge 0625 · P1	C	Both lines are horizontal → each runner moves at constant speed (zero acceleration). Runner 1's line is higher, so **runner 1 is moving faster than runner 2**. The graph does not show start times or separation.
B15	Cambridge 0625 · P1	C	Non-uniform acceleration = a *curved* part of the speed–time graph (changing gradient). A is a straight rise, B is flat, D is a straight fall — all uniform. The curved section is **C**.

Section C · Free-fall

Q #	Exam reference	Answer	Brief working / reason
C1	Cambridge 0625 · P1	C	As speed rises, air resistance increases until it balances the weight; the resultant force is then zero, so acceleration is zero and the speed stays constant → **air resistance increases and balances his weight so that his acceleration is zero**.
C2	Cambridge 0625 · P1	A	A falling skydiver always has weight (down) and air resistance (up); at terminal velocity they are equal and opposite but both still act → **air resistance and weight**.
C3	Cambridge 0625 · P1	C	At t_1 (just dropped) speed = 0 so air resistance = 0 and acceleration = g = 10 m/s². At t_2 (terminal velocity) the forces balance, so acceleration = 0 → row **C (10 then 0)**.
C4	Cambridge 0625 · P1	A	At terminal velocity the resultant force is zero, so the acceleration is zero throughout → **constant at 0 m/s²**.
C5	Cambridge 0625 · P1	C	Equal-volume spheres, masses P = 0.50 kg, Q = 1.0 kg. Released together they fall with the same acceleration g, so the force (weight) on each is W = mg: Q's mass is double, so **the force on Q is double the force on P**.
C6	Cambridge 0625 · P1	C	At terminal velocity forces balance. Opening the parachute raises the upward air resistance above the weight, so the resultant force is **upwards** and the acceleration (deceleration) is also **upwards** → row **C (upwards, upwards)**.
C7	Cambridge 0625 · P1	C	Before terminal velocity the weight (downward force) stays the same; as speed grows the air resistance (upward force) increases; so the resultant (weight − air resistance) decreases → row **C (stays the same, increases, decreases)**.
C8	Cambridge 0625 · P1	C	At terminal velocity the resultant force is zero, so acceleration = **zero**; the velocity is steady and non-zero (**constant**) → row **C**.
C9	Cambridge 0625 · P1	C	The apple speeds up as it falls, so the forces on it are **unbalanced** (weight greatly exceeds the small air resistance) and the motion is **acceleration** → row **C (unbalanced, acceleration)**.
C10	Cambridge 0625 · P1	D	The Moon has no atmosphere, so no air resistance: all objects fall with the same acceleration regardless of mass. Dropped from the same height at the same time, **the two spheres hit the ground together**.
C11	Cambridge 0625 · P1	C	Acceleration equals free-fall g at all times only with no air resistance, i.e. in a vacuum. A feather in an evacuated tube falls in a vacuum, so a = g throughout → **a feather falling in a vertical tube that contains a vacuum**.
C12	Cambridge 0625 · P1	D	

Q #	Exam reference	Answer	Brief working / reason
			Falling at steady speed → forces balanced. Just after the parachute opens, air resistance suddenly exceeds the weight, so the resultant force is **upwards** and the acceleration is also **upwards** → row **D (upwards, upwards)**.

Note from Megalecture. This compilation mixes pure-kinematics items (speed, velocity, acceleration and motion graphs) with free-fall / terminal-velocity questions. All graph answers were obtained by reading the gradient (for acceleration) or the area (for distance) directly from each figure; free-fall items take $g = 10\ \text{m/s}^2$. These are original Megalecture worked solutions prepared for revision use.