



MARK SCHEME

PHYSICS

Paper II

Maximum Mark: 60

Generic Marking Principles

These generic marking principles must be followed by all markers when assessing candidates' responses. They should be used together with the specific details provided in the mark scheme or the generic level descriptors for each question. Every question paper and its corresponding mark scheme will also adhere to these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in accordance with:

- the specific content of the mark scheme or the generic level descriptions provided for the question,
- the specific skills identified in the mark scheme or descriptors, and
- the standard of performance expected from candidates, as exemplified through standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Only whole marks are to be awarded. No half marks or fractional marks should be given under any circumstances.

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded positively:

- Credit must be given for correct and valid responses, as outlined in the mark scheme.
- Where a candidate's response exceeds the expected content or extends beyond the syllabus in a relevant way, appropriate credit may be awarded, in consultation with the Chief Marker.
- Marks are awarded when the candidate demonstrates clear evidence of knowledge, understanding, or skill.
- Marks must not be deducted for incorrect answers, omissions, or irrelevant material.
- Spelling, punctuation, and grammar should only be considered if explicitly stated in the question's assessment criteria. However, responses must be sufficiently clear in meaning.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently across all scripts, including cases where candidates do not follow specific instructions or where generic level descriptions are applied. For example, if a candidate writes more answers than required or responds in the wrong format, the marker should still assess the response based on the marking scheme. If the marking scheme includes a penalty for not following instructions, it should be applied. If no penalty is mentioned, valid responses should still be credited. In the case of generic level descriptions such as "basic understanding" or "detailed explanation", all markers must interpret and apply these levels in the same way across all scripts. This helps ensure that every candidate is marked fairly and consistently.

GENERIC MARKING PRINCIPLE 5:

The full range of marks available in the mark scheme must be used where appropriate. However, the actual distribution of marks may depend on the quality of responses observed.

GENERIC MARKING PRINCIPLE 6:

Marks must be awarded strictly based on the criteria and expectations defined in the mark scheme. Judgments should not be influenced by grade thresholds, grade descriptions, or assumptions about overall candidate performance.

Point-Based Marking

Guidance

- DO credit answers which are worded differently from the mark scheme if they clearly convey the same meaning (unless the mark scheme requires a specific term).
- DO credit alternative answers/examples which are not written in the mark scheme if they are correct.
- DO NOT credit answers simply for using a 'key term' unless that is all that is required. (Check for evidence it is understood and not used wrongly.)
- DO NOT credit answers which are obviously self-contradicting or trying to cover all possibilities.
- DO NOT give further credit for what is effectively repetition of a correct point already credited unless the language itself is being tested. This applies equally to 'mirror statements' (i.e. polluted/not polluted).
- DO NOT require spellings to be correct, unless this is part of the test. However, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. Corrasion/Corrosion).

Calculation

- The mark scheme will outline the steps for the most likely correct method(s), including the marks allocated for each step, the correct answer(s), and the marks awarded for the final answer.
- If working or explanation is required to obtain full credit, this will be clearly stated in both the question paper and the mark scheme. In all other cases, a correct final answer should receive full marks even if no supporting working is provided.
- If a candidate applies a valid method that is not specifically included in the mark scheme, equivalent marks should be awarded for achieving equivalent stages of the solution.
- Where a candidate uses an incorrect figure obtained from earlier working, the 'own figure rule' applies. Full marks may still be awarded provided the method used is correct and complete. Additional guidance or exceptions to this principle will be specified in the mark scheme where necessary.

Abbreviations used in the Mark Scheme

/alternative answers for the same marking point underline actual word given must be used by candidate (grammatical variants accepted)

(brackets) the word or phrase in brackets is not required, but sets the context

B marks: These are independent marks, which do not depend on other marks. For a B mark to be awarded, the point to which it refers must be seen specifically in the candidate's answer.

M marks: These are method marks upon which A marks later depend. For an M mark to be awarded, the point to which it refers must be seen specifically in the candidate's answer. If a candidate is not awarded an M mark, then the later A mark cannot be awarded either.

C marks: These are compensatory marks which can be awarded even if the points to which they refer are not written down by the candidate, providing subsequent working gives evidence that they must have known them. For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct working which shows the candidate knew the equation, then the C mark is awarded.

If a correct answer is given to a numerical question, all of the preceding C marks are awarded automatically. It is only necessary to consider each of the C marks in turn when the numerical answer is not correct.

A marks: These are answer marks. They may depend on an M mark or allow a C mark to be awarded by implication.

Question Number			Main Answer	Mark Scheme		Marking Guidelines
QI	1	-	- Balanced forces. - The box remains at rest / stationary (as it was initially at rest and net force is zero).	B1: for 'balanced'. B1: for 'remains at rest' / 'no change in motion'.	2	ALLOW: - Forces are equal and opposite - Velocity stays zero / does not move NOT: - Unbalanced - Box moves at a constant speed (since it says 'pushed... as shown', implies starting conditions/effect) IGNORE: - Minor spelling errors or grammatical errors.
	2	-	Graph showing three distinct segments: - Straight line from (0,0) to (4,6). - Horizontal line from (4,6) to (7,6). - Straight line from (7,6) to (10,11).	B1: First segment correct (up to 4s). B1: Second segment horizontal from 4 to 7s. B1: Third segment rising 5m over next 3s (ends at 10s, 11m)	3	ALLOW: - Minor line wobbles if points are clearly plotted correctly NOT: - Curves instead of straight lines - Third segment ending at wrong coordinates IGNORE: - Extrapolations beyond 10 s

	3	a	Velocity = 6.0 m/s	B1: Correct value reading from graph	1	ALLOW: • 6 m/s NOT: • Any value other than 6 m/s IGNORE: • Missing units
	3	b	Matching pairs: • BC → Zero Acceleration • CD → Negative Acceleration	B1: matches correctly B1: matches correctly	2	ALLOW: • Clear unambiguous lines drawn NOT: • Multiple lines from one phase IGNORE: • Cross-overs that are legible
	3	c	Displacement = Area under velocity-time graph from t=0 to t=2 s. • Area = $0.5 \times \text{base} \times \text{height}$ • Area = $0.5 \times 2 \text{ s} \times 4.0 \text{ m/s} = 4.0 \text{ m}$	C1: Formula or working shown ($0.5 \times 2 \times 4$) A1: 4.0 (m)	2	ALLOW: • 4 NOT: • Formula for distance = speed $\times$ time without 0.5 (yields 8) IGNORE: • Unit omission in working

QII	1		- Pressure increases with depth. - Pressure increases with density of liquid ($p = h\rho g$).	B1: Depth and pressure relationship statement B1: Density and pressure relationship statement	2	ALLOW: - Directly proportional if formula cited NOT: - Inverse relationship statements IGNORE: - Atmospheric pressure inclusion
	2	-	Upthrust = $V \times \rho \times g$ - Upthrust = $3.5 \times 10^{-3} \times 1025 \times 10$ - Upthrust = 35.875 N $\rightarrow$ 35.9 N or 36 N	M1: Formula, substitution and correct calculation steps. A1: 35.9 (N) / 36 (N)	2	ALLOW: 35.88 NOT: - Incorrect g usage if specified IGNORE: - Minor rounding variations
	3	a	Pascal's Law states that pressure applied to an enclosed fluid is transmitted undiminished to every portion of the fluid and to the walls of its container.	B1: Undiminished transmission in enclosed fluid	1	ALLOW: - Pressure is equal everywhere in a confined liquid NOT: - Force is transmitted equally IGNORE: - Examples given without definition

	3	b	Pressure = Force / Area • Pressure = $200 \text{ N} / 2.5 \text{ m}^2 = 80 \text{ N/m}^2$ (or Pa)	M1: $P = F/A$ substitution A1: $80 \text{ (N/m}^2 \text{ or Pa)}$	2	ALLOW: • 80 Pascals NOT: • Incorporation of diameter (2cm is extra information here given Area is explicitly
						stated as 2.5 m^2) IGNORE: • Extraneous unit written incorrectly if value is 80
	4	-	• Container X has greater pressure at the bottom. • Because liquid X has higher density than liquid Y ($1000 \text{ vs } 800 \text{ kg/m}^3$). • Depth is the same, and $p \propto \rho$.	B1: Identifies X as higher pressure B1: Identifies higher density of X B1: Explicit link linking p to density for identical depths	3	ALLOW: • Qualitative equivalence arguments NOT: • Container Y has greater pressure IGNORE: • Base area differences
QIII	1	-	• Perfume particles move randomly / undergo diffusion. • Particles collide with air molecules and spread from high concentration to low concentration.	B1: Diffusion / random kinetic movement B1: Spreading due to collisions / concentration gradient	2	ALLOW: • Continuous random motion NOT: • Bulk movement / wind only IGNORE: • Scent definition details

	2	-	- Heat all rods simultaneously at the central junction. - Observe the rate/order or length of wax melting on each rod; the one that melts fastest/furthest is the best conductor.	B1: Uniform heating arrangement B1: Observation criterion (speed or extent of wax melting)	2	ALLOW: - Measuring time taken to melt a fixed distance NOT: - Heating rods separately without timing IGNORE: - Naming the expected winner (copper)
	3	-	- Student is incorrect. - Particles do NOT change size or shrink during phase change; only the separation/distance between them decreases.	B1: Disagrees with student / states size is constant B1: Explains that spacing/arrangement changes instead	2	ALLOW: - Mass and size of individual atoms remain identical NOT: - Agreeing with student IGNORE: - Definition of solid/liquid differences
	4	-	- Potential energy of the molecules decreases as bonds/intermolecular forces form/strengthen. - Kinetic energy remains constant because temperature does not change.	B1: Intermolecular PE decreases / bonds form B1: KE remains constant (no temp change)	2	ALLOW: - Heat energy is released NOT: - Kinetic energy decreases IGNORE: - Microscopic speed descriptions if conflicting

	5	-	- Liquids with high specific heat capacity (like water) absorb large amounts of heat energy with small temperature rises. - This makes them highly effective coolants in car radiators/industrial systems.	B1: High SHC means large heat absorption per degree B1: Applied usage as coolant (e.g., water)	2	ALLOW: - Takes a long time to heat up NOT: - Low specific heat capacity liquids used for cooling IGNORE: - Specific numerical values for water
QIV	1	-	Correct matching: - Pin 2 → Neutral - Pin 3 → Live	B1: Pin to Neutral B1: Pin 3 to Live	2	ALLOW: Lines or lists clear to examiner NOT:
						- Pin 2 to anything other than Earth IGNORE: - Color annotations
	2	a	In Circuit Y (Series): - Total voltage = $V_1 + V_2$ - Voltmeter reading = $12\text{ V} - 5\text{ V} = 7\text{ V}$.	M1: $V_{\text{total}} = V_1 + V_2$ A1: 7 (V)	2	ALLOW: 7 NOT: 12 V IGNORE: - Unit missing

	2	b	In Circuit X (Parallel): • Potential difference across parallel branches is equal to source voltage. • Voltage across Lamp B = 12 V.	M1: Recognizes parallel circuit behavior A1: 12 (V)	2	ALLOW: • Statement that parallel voltage equals supply voltage NOT: • 7 V (12 - 5 is incorrect because branches are parallel) IGNORE: • Calculations for series if clearly labeled separate
	2	c	• Circuit X. • In parallel (Circuit X), Lamp B receives the full supply voltage (12V), whereas in series (Circuit Y), the voltage is shared (7V).	B1: Identifies Circuit X B1: Reason referencing full voltage vs shared voltage	2	ALLOW: • 12V > 7V explanation NOT: • Circuit Y chosen IGNORE: • Brightness descriptions unless linked to
						potential difference.
	3	-	Any two from: • Speed of rotation of the coil • Strength of the magnetic field • Number of turns on the coil • Area of the coil	B1: First valid factor B1: Second valid factor	2	ALLOW: • Speed of magnet movement NOT: • Material of wire (unless resistance mentioned contextually, but not for induced e.m.f. magnitude directly) IGNORE: • Minor spelling errors

QV	1	-	Ray diagram completion: • Ray passing through F_2	B1: Ray passing through F_2	1	ALLOW: • Small inaccuracies in straightness if intent is clear NOT: • Ray bending in wrong direction IGNORE: • Arrowheads missing
	2	-	• Monochromatic light consists of a single wavelength/frequency. • White light is a mixture of many wavelengths/all visible colors.	B1: Monochromatic described as single wavelength B1: White light described as combination of colors/wavelengths	2	ALLOW: • White light can be dispersed, monochromatic cannot NOT: • Monochromatic means black and white IGNORE: • Laser examples
	3	a	A longitudinal wave produced by vibrations that travels through a medium as a series of compressions and rarefactions.	B1: Precise definition mentioning longitudinal or compression/rarefaction	1	ALLOW: • Wave audible to human ear within 20-20000Hz NOT: • Electromagnetic wave IGNORE: • Speed values

	3	b	• Mechanical: Requires a medium to travel / cannot travel through a vacuum. • Longitudinal: Particles vibrate parallel to the direction of wave propagation.	B1: Explains mechanical (medium needed) B1: Explains longitudinal (parallel vibration)	2	ALLOW: • Back and forth motion for longitudinal NOT: • Vibrates perpendicular IGNORE: • Graphical representations
	4	a	• Signal A: Analogue (or Analog) • Signal B: Digital	B1: Signal A correct B1: Signal B correct	2	ALLOW: • Continuous vs Discrete waveforms names NOT: • Sine wave vs Square wave as category replacements if standard names sought IGNORE: • Case formatting
	4	b	• Signal A transmits continuously varying voltage/amplitude values. • Signal B transmits data encoded as discrete binary	B1: Analogue continuous description B1: Digital binary/pulse	2	ALLOW: • States vs continuous flow NOT:
			pulses (1s and 0s / High and Low).	description		• Descriptions reversing the two IGNORE: • Advantages/Disadvantages discussions

QVI	1	-	Daughter nucleus X: • Mass number = 90 • Atomic number = 39 (Since β -decay increases proton number by 1: $38 + 1 = 39$, mass remains unchanged)	B1: Atomic number 39 B1: Mass number 90	2	ALLOW: • Correct symbol Yttrium (Y) if written, but not required NOT: • Any change to mass number IGNORE: • Beta particle representation on the side
	2	-	The time taken for half the radioactive nuclei in a sample to decay / activity to halve.	B1: Clear definition highlighting 'half the nuclei' or 'half activity'	1	ALLOW: • Half-life definition using graphs NOT: • Half the time it takes to decay completely IGNORE: • Background radiation details
	3	-	Any two from: • Use long tongs to handle sources • Store sources in lead-lined containers • Do not point sources at people • Wear protective film badges / clothing	B1: First valid precaution B1: Second valid precaution	2	ALLOW: • Keep a safe distance NOT: • Wash hands (too generic unless specific contamination noted) IGNORE: • Goggles unless alpha powder
						mentioned

	4	-	• Infrared • Visible light • Ultraviolet	B1: Infrared B1: Visible B1: Ultraviolet	3	ALLOW: • Any order NOT: • X-rays / Gamma rays IGNORE: • Specific wavelength values
	5	a	Milky Way (galaxy)	B1: Correct name	1	ALLOW: • Milky Way NOT: • Andromeda IGNORE: • Solar system repetition
	5	b	The gravitational pull of the Sun keeps all planets in orbit around it / Planets revolve around the Sun.	B1: Gravitational dominance/holding orbits	1	ALLOW: • Center of mass is inside the Sun NOT: • It is the biggest object (must imply mass/gravity contextually) IGNORE: • Brightness or light emission