

Markscheme

May 2026

Physics

Standard level

Paper 1B

8 pages

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Subject Details: Physics HL/SL Paper 1B Markscheme

Mark Allocation

Candidates are required to answer **ALL** questions. Maximum total = [20 marks].

1. Each row in the “Question” column relates to the smallest subpart of the question.
2. The maximum mark for each question subpart is indicated in the “Total” column.
3. Each marking point in the “Answers” column is shown by means of a tick (✓) at the end of the marking point.
4. A question subpart may have more marking points than the total allows. This will be indicated by “max” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
5. An alternative wording is indicated in the “Answers” column by a slash (/). Either wording can be accepted.
6. An alternative answer is indicated in the “Answers” column by “**OR**” between the alternatives. Either answer can be accepted.
7. An alternative markscheme is indicated in the “Answers” column under the heading **ALTERNATIVE 1** etc. Any alternative can be accepted.
8. Words in angled brackets « » in the “Answers” column are not necessary to gain the mark.
9. Words that are underlined are essential for the mark.
10. The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
11. If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect) in the “Notes” column.
12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. “Allow ECF” will be displayed in the “Notes” column.
14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.
15. Allow reasonable substitutions where in common usage, *eg* ° for rad.

Question			Answer	Notes	Total
1.	a		Two max from: Equation matches «shape of» equation for a straight line $y = mx + c$ ✓ c is a positive intercept / F_0 when $x = 0$ ✓ Gradient on graph is negative to match sign of equation ✓	MP2: y - intercept is 7.0 - 7.1 / weight of the cylinder « when not submerged »	[2] Max
1.	b		Correctly reads of any two data points <u>from the line drawn</u> and attempts to calculate gradient ✓ Gradient calculated correctly ✓	MP2: Allow the following range for the gradient 18.4 - 19.5 Nm^{-1}	[2]

1.	c	ALTERNATIVE 1 Equating the gradient to $\rho_1 Ag$ ✓ Calculate density of liquid, in the range 762 kg m⁻³ - 808 kg m⁻³ ✓ ALTERNATIVE 2 Substitute F_0 and a point on the line (F, x) into the equation and solve for density ✓ Calculate density of liquid, in the range 762 kg m⁻³ - 808 kg m⁻³ ✓	Allow ECF from incorrect gradient /area. (Do not allow ECF for use of wrong circumference /surface area expressions) Allow $g=10 \text{ ms}^{-2}$ Allow ECF for MP2 if the calculated density does not fall within the specified range for ALT 1 and ALT 2	[2]
1.	d	Intercept read off = 7.1 N ✓ ALTERNATIVE 1 Work to show that $\rho_w = 970 \text{ kg m}^{-3}$ « $(m_w = \frac{F_0}{g}, V = \pi r^2 l, \rho_w = \frac{m_w}{V_w})$ » ✓ Ratio of 1.3 ✓ OR ALTERNATIVE 2 Work to show that $\frac{\rho_w}{\rho_l} = \frac{F_0}{l \times \text{gradient}}$ / substitution ✓ Ratio of 1.3 ✓	Allow a range of 7.0 - 7.2 N for F_0 (the weight of the cylinder when not in the liquid) Expect 0.71 - 0.74 kg for mass of wood, and $V_w = 7.39 \times 10^{-4} \text{ m}^3$ Allow a range of 970 kg m⁻³ - 990 kg m⁻³ for the density of the wood Allow ECF from 1(c) for incorrect density of liquid in MP2 Allow a range of 1.2 - 1.3 for the ratio Allow ECF for incorrect gradient from 1(b) in ALT 2 Allow ECF for MP2 substitution is shown Award CNA Allow $g = 10 \text{ ms}^{-2}$	[3]

Question			Answer	Notes	Total
2.	a	i	$R = \frac{V}{I} = 3.61 \, \Omega \quad \checkmark$		[1]
2.	a	ii	A dot with no error bar is all that is required to identify the point AND draws a straight line through the error bars $\checkmark$		[1]
2.	b	i	The rate of heat loss is decreasing $\checkmark$		[1]

2.	b	ii	Better to take readings for equal temperature increments / take readings more often at beginning of the experiment OWTTE ✓	Do not allow "take more trials and average" OR "Insulating the container" unless mention is made of allowing for/taking more readings.	[1]
2.	c	i	$\rho = \frac{RA}{l}$ = 2.06 x 10 ⁻⁸ Ω m ✓	ECF from 2a(ii) Accept answers for the resistivity between 1.9 x 10 ⁻⁸ Ω m – 2.1 x 10 ⁻⁸ Ω m.	[1]
2.	c	ii	Fractional uncertainty calculated correctly for one of R OR l OR A ✓ All three fractional uncertainties calculated correctly and summed ✓	0.011 / 0.004 / 0.007 OR correct fractional uncertainty shown Expect 0.022, accept 0.02, 0.03 OR as a percentage for both MP1 and MP2 ; allow ECF from MP1	[2]

2.	c	iii	Attempt to calculate (ans to ci) x (ans to cii) ✓ $(2.06 \pm 0.05) \times 10^{-8} \Omega \text{ m}$ OR $(2.1 \pm 0.1) \times 10^{-8} \Omega \text{ m}$ ✓	<i>Allow correct numerical answer</i> <i>Must see correct unit, $\Omega \text{ m}$ in MP2 .</i> <i>Decimal places in value and absolute uncertainty must match (for any uncertainty given)</i>	[2]
2.	d	i	Systematic error ✓	<i>Accept calibration error OR zero « offset » error</i>	[1]
2.	d	ii	The original points/ line/ data/ graph are to the left of the corrected «by 0.6 °C » OR The original line/ graph is shifted upwards	<i>Allow</i> <i>The <u>corrected</u> points/ line/ data/ graph are to the right of the original</i> <i>The <u>corrected</u> line/ graph is shifted downwards</i>	[1]