

Markscheme

May 2026

Physics

Higher level

Paper 1B

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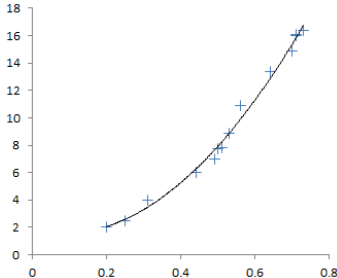
Subject Details: Physics HL/SL Paper 1B Markscheme

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			Answers	Notes	Total
1.	a		«Temperature change will affect» Volume/radius/diameter/size of bubbles OR viscosity /density «of water» ✓	<i>Do not accept just 'pressure' unless volume, radius, diameter or size are also mentioned</i> <i>Do not accept speed or KE of bubble.</i> <i>Do not accept density or viscosity of the bubble</i>	[1] max
1.	b	i.	ρ - «water»density, η - «water»viscosity g – acceleration due to gravity/free fall OR gravitational field strength OR 9.8 OR 10 ms⁻² ✓	<i>Allowing unspecified density & viscosity, but not density or viscosity of bubble</i> <i>Do not accept just 'gravity' OR gravitational force</i> <i>All three must be correct</i>	[1] max
1.	b	ii.	Observe video/camera/frames ✓ equal/constant distance «between bubbles» (OWTTE) ✓	MP1: Reference to video camera/recorder or frames is needed. MP2 is independent of any reference to camera frames Accept drawing of v-t graph and looking for zero gradient Accept drawing of displacement - time graph and looking for constant gradient Do not accept unspecific answers like 'velocity will be constant'	[2]

1.	c		Any attempt at a curve of mainly increasing gradient ✓	Line does not need to go through (0,0) Example below, but judge by eye generously.  Do not penalise poor graphical skills. Expect undulations and short straight sections in a hand drawn curve. As long as an obvious attempt at a quadratic, and not a straight line fit, is made you can award the mark.	[1]
1.	d		Plot « v versus » d^2 OR Plot root v «versus d» OR log v versus log d (OR ln) ✓	OWTTE Accept use of d^2 without mention of v. Accept use of root v without mention of d Allow axes to be reversed	[1]
1.	e	i.	$v = \frac{d}{t} = \frac{1.7}{\left(\frac{10}{24}\right)} \Rightarrow 4.1 \text{ cm s}^{-1} \checkmark$	Do not accept read-off from the graph. Working need not be shown No sf penalty. e.g. accept 4 cm s^{-1} Accept 0.04 ms^{-1}	[1]

1.	e	ii.	$\frac{\Delta v}{v} = \left(\frac{0.1}{1.7} \right) + \left(\frac{1}{24} \right) \checkmark$ = 10% ✓	MP1: Valid method must be shown Allow working which calculates each % uncertainty separately and adds (5.9% + 4.2%) MP2 must be integer only (no decimal places, not even 0)	[2]
1.	e	iii.	Data points plotted at (0.3, speed value on their drawn line of best fit at d = 0. 3) OR (0.3, candidate answer to 1ei) OR (0.31, 4) ✓ Error bar for v: Their % or decimal % answer to 1eii applied to any of the above points ✓	MP2: Accept answers within +/- 0.5 of a square of the calculated value. Judge by eye	[2]

Question			Answers	Notes	Total
2.	a		0.2 m distance is too close OR Time recorded is negligible/too small OR echo and clap overlap / arrive at microphone at «almost » the same time OR wall closer than the microphone ✓ 30 m is too far OR echo intensity will be too small/undetectable ✓	OWTTE OWTTE	[2]
2.	b		No wind ✓ No additional walls/surfaces to cause additional reflections ✓ No external sounds/interference ✓ Sharp, quick sound ✓ Microphone should be same/similar distance from wall as the student ✓	OWTTE <i>Accept sensible alternatives</i>	[1] Max
2.	c	i.	Line doesn't/should pass through origin / (0,0)	<i>Accept 'doesn't pass through 0'</i> <i>Accept non zero intercept.</i>	[1]

2.	c	ii.	Reference to distance between student/clap and microphone ✓ Deduces microphone is closer to wall than the student ✓	OWTTE <i>Accept student & microphone are at different distances to, wall</i>	[2]
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2.	d	Speed = $2 \times \frac{\text{distance}}{\text{time}}$ ✓ Use of gradient or inverse e.g. = $\frac{(0.066 - 0)}{(10 - 0.4)}$ (allow any other correct pair of data points to be used) ✓ Speed = « $\frac{2}{\text{gradient}}$ » = 291 ms^{-1} - allow range 270 to 310 ms^{-1} ✓	MP1: Factor of 2 seen in words or symbols or working even if rest of calculation is invalid MP2: Allow gradient correctly expressed as a fraction (need to view graph) Do not accept gradient value from a single data point. eg (6, 0.41) Evidence for gradient use may be 'hidden' in working without specific mention. MP3: Allow ECF from MP2 if gradient is incorrect or a single point was used. Allow ECF from MP1 Allow answers to fewer sf.	[3]
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