



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

PHYSICS

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Paper 6 Alternative to Practical

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MARK SCHEME

Maximum Mark: 40

Published

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This document consists of **5** printed pages.

Question	Answer	Marks
1(a)	$W_1 = 1.5 \text{ (N)}$	1
1(b)(i)	$V_1 = 155 \text{ (cm}^3\text{)}$	1
1(b)(ii)	line of sight perpendicular	1
	to bottom of meniscus	1
1(c)	$W_2 = 0.7 \text{ (N)}$ <u>and</u> $V_2 = 235 \text{ (cm}^3\text{)}$	1
1(d)	$\rho_1 = 1.0$ or ecf	1
	unit g/cm^3	1
1(e)	$m_1 = 241 \text{ (g)}$	1
1(f)	$\rho_{AV} 0.978 / 0.977 \text{ (g/cm}^3\text{)}$	1
1(g)	appropriate cause of inaccuracy: e.g: <ul style="list-style-type: none"> • some water still in empty measuring cylinder • water spilled, splashed when putty put in water • water drops on putty when removed • air bubbles on putty 	1
	suitable improvement: e.g: <ul style="list-style-type: none"> • measure m_2 at start (when cylinder dry) • measure new volume in Method OR refill to correct value • shake putty to remove air / smooth surface to minimise bubbles 	1
	Total:	11

Question	Answer	Marks
2(a)(i)	correct voltmeter symbol connected in parallel across P and Q	1
2(a)(ii)	$I = 0.38(\text{A})$	1
2(b)	graph: axes labelled with quantity and unit	1
	appropriate scales (plots occupying at least $\frac{1}{2}$ grid)	1
	plots all correct to $\frac{1}{2}$ small square	1
	well-judged straight line <u>and</u> thin line, precise plots	1
2(c)(i)	<i>M</i> present and triangle method <u>seen on graph</u>	1
2(c)(ii)	<i>R</i> in range 1.8 to 2.4 Ω	1
	2 or 3 sig figs <u>and</u> unit = Ω	1
2(d)	suitable reason: wire becomes too hot, current exceeds full scale deflection(owtte) of meter / becomes too large	1
2(e)	correct symbol for variable resistor (rectangle with strike-through arrow only)	1
	Total:	11

Question	Answer	Marks
3(a)	$\theta = 30^\circ \pm 1^\circ$	1
3(b)	distance $\geq 5 \text{ cm} \leq 15 \text{ cm}$	1
3(c)(i)	normal correct	1
3(c)(ii)	$a = 6.4 \text{ (cm)}$ <u>and</u> $b = 4.3 \text{ (cm)}$	1
3(c)(iii)	$n = 1.49$ or ecf	1
	2 or 3 sig figs <u>and</u> no unit	1
3(d)(i)	all lines in correct places and neat	1
	$\alpha = 28^\circ \pm 3$	1
3(d)(ii)	statement matching results	1
	justification matching the statement ('within limits of experimental accuracy' / owtte)	1
3(e)	difficulty in aligning pins / placing pins accurately, pins (too) thick	1
	Total:	11

Question	Answer	Marks
4 MP1	apparatus beaker <u>with</u> insulation <u>and</u> thermometer <u>and</u> stopclock (or alternative) mentioned	1
MP2	method pour <u>hot</u> water into container measure temperature of hot water over period of time	1
MP3	repeat for additional layers	1
MP4	results: suitable table / graph / cooling curve	1
MP5	control variables any pair from: same initial temperature, same volume of water, same size/material/thickness of beaker, same thickness of each layer,	1
MP6 MP7	additional points any 2 from: how cooling rate calculated/how to compare cooling curves, read thermometer perpendicularly, thermometer at same depth (for repeat) thermometer not touching beaker, stir before reading thermometer, use of lid, minimum of 5 different thicknesses of insulation, repeat experiment with different sized beakers/different amount of water, sensible amount of water (50 cm ³ to 500 cm ³)	2
	Total:	7