Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/31**

Paper 3 Practical Test **May/June 2017**

MARK SCHEME

Maximum Mark: 30

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(a)	evidence of repeats used to obtain t seen in (a) or (b)	**B1**
	$t_1 = 4 \pm 1$ s or centre value $\pm$ 1 s	**B1**
1(b)	any $t_1 < t_2$ and correct unit seen in (a) or (b)	**B1**
1(c)	t_1 / t_2 in range 1.80 to 2.20	**B1**
	ratio correct , given to 2 or 3 s.f. with no unit	**B1**

Question	Answer	Marks
2(a)	length given to nearest mm, with unit, and to centre value ± 1.0 cm if no centre value (from supervisor or candidate scripts), allow in range 8.0–11.0 cm	**B1**
2(b)(i)	vary / measure the distance between the lamp and the object / along XZ(owtte) (1)	**B2**
	compare / measure (the length of) the shadow (along PZQ) (owtte) (1)	
	allow 1 mark for 'move object and measure shadow' max 1 mark if lamp moved	
2(b)(ii)	*y*-axis labelled: length of shadow / PZQ, units not required	**C1**
	straight line decreasing or curve decreasing	**A1**

Question	Answer	Marks
3(a)(i)	centre value ± 0.5 V or 1.5 to 3.5 V, readings to at least 0.1 V, with unit	**B1**
3(a)(ii)	centre value ± 0.5 V or 1.5 to 2.2 V, readings to at least 0.1 V, with unit	**B1**
3(a)(iii)	V_{AC} in range (V_{AB} + V_{BC}) ± 0.2 allow centre value ± 0.2	**B1**
3(b)	current, I, with unit e.g. 0.0089 A (i.e. (a)(i) / 330)	**B1**
3(c)	resistance R_L to 2 or 3 s.f. with unit e.g. 224 Ω allow centre value ± 30 ohms or ecf (a)(ii) / (b) in range 150–250 ohms if no centre value available	**B1**

Question	Answer	Marks
4(a)	room temperature close to centre value if given or in range 15–45 °C unit required, accept correct symbol or 'Celsius'	**B1**
4(b)(i)	current I less than 1 A to at least 1 d.p. unit required	**B1**
4(b)(ii)	sensible value for P (b)(i)$^2 \times 4$ in range 0.1 W up to 4 W	**B1**
4(c)(i)	headings for table, with units: temperature / °C time / s	**B1**
4(c)(iii)	correct trend in results: temperature increases with time	**C1**
	temperature rises increase by 2.0 °C from θ_r	**C1**
	all times and temperatures present, starting with $\theta = (\theta_r + 2)$ (additions all performed) and finishing at $\theta = (\theta_r + 18)$	**A1**
4(d)	graph: axes labelled, with units, temperature on the x-axis	**B1**
	suitable scale, not based on 3, 6, 7 etc. with plotted data occupying at least half the page in both directions; the origin may be included	**B1**
	all the data in table plotted, points plotted correctly on a scale that is easy to follow at least two points checked, points must be within ½ small square of the correct position	**B1**
	best fit, fine line (curved or straight) and fine points or crosses	**B1**

Question	Answer	Marks
4(e)	tangent drawn to the curved best line at $(\theta_r + 11)$ °C	**M1**
	correct calculation of the gradient, given to 2 / 3 s.f., ignore any units	**A1**
	a large gradient triangle used, based on the tangent used	**B1**
	or	
	(in cases where there is no obvious curve indicated by the plotted data and a best fit straight line has been drawn then allow calculation of the gradient using a gradient triangle including $(\theta_r + 11)$ °C)	**(M1)**
	correct calculation of the gradient, given to 2 / 3 s.f., ignore any units	**(A1)**
	a large gradient triangle used centred near or on $(\theta_r + 11)$ °C	**(B1)**