CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9702 PHYSICS

9702/35

Paper 3 (Advanced Practical Skills 1), maximum raw mark 40

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



Pag	ge 2	Mark Scheme	Syllabus	Paper	
		GCE AS/A LEVEL – May/June 2013	9702	35	
(a)		Value of T in range $0.4 \le T \le 1.4$ s. Evidence of repeats.		[1] [1]	
		ets of readings of m and t (or T) scores 5 marks, four se from Supervisor -1 .	ets scores 4 marks	etc. [5]	
	Ran	ge of $m: \Delta m \ge 0.600 \mathrm{kg}$		[1]	
	Column headings: [1] Each column heading must contain a quantity and a unit. The presentation of quantity and unit must conform to accepted scientific convention e.g. $1/T^2/s^{-2}$. Do not allow $1/T^2(s)^2$				
		sistency: alues of raw <i>t</i> must all be given to the nearest 0.1 s or 0.0	01 s.	[1]	
	Sign	ficant figures: ficant figures for every row of values of $1/T^2$ same as or T) as recorded in table.	one greater than	[1]	
		ulation: es of 1/ <i>T</i> ² calculated correctly		[1]	
(c)	;	Axes: Sensible scales must be used, no awkward scales (e.g. Scales must be chosen so that the plotted points occupy both <i>x</i> and <i>y</i> directions. Scales must be labelled with the quantity that is being plocale markings should be no more than three large squares.	at least half the gotted.	[1] raph grid in	
		Plotting of points: All observations in the table must be plotted. Diameter of points must be ≤ half a small square (no "blo Work to an accuracy of half a small square.	obs").	[1]	
		Quality: All points in the table must be plotted (at least 5) for this points must be less than $0.1 \mathrm{s}^{-2}$ of $1/T^2$ from a straight lin		[1] ded. Scatter of	
	:	Line of best fit: Judge by balance of all points on the grid about the cand There must be an even distribution of points either side of Allow one anomalous point only if clearly indicated (i.e. of candidate. Line must not be kinked or thicker than half a	of the line along th circled or labelled)	e full length.	
(,	Gradient: The hypotenuse of the triangle must be at least half the Both read-offs must be accurate to half a small square in			

Mark Scheme

Syllabus

Paper

Page 2

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Page 3		3	Mark Scheme		Paper
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		Eithe Corr Read Or:	ercept: er: ect-read off from a point on the line and substituted into d-off must be accurate to half a small square in both x a ect read-off of the intercept directly from the graph.	•	[1]
	(d) Va	alue of	P = candidate's gradient. Value of Q = candidate's inter	cept.	[1]
	Ur	nit for F	$^{\rm C}$ (kg $^{\rm -1}$ s $^{\rm -2}$) correct and consistent with value and Q (s $^{\rm -2}$)		[1]
					[Total: 20]
2	(a) (i)) Valu	e of L in range $8.0 \le L \le 12.0$ cm with consistent unit to	the nearest mm	. [1]
	(ii)	If rep	blute uncertainty $1 \le \Delta L \le 3$ mm. Deated readings have been taken, then the uncertainty content and of calculation to get percentage uncertainty.		range. [1]
	(b) (iii)) Valu	e of raw <i>N</i> ₁ an integer.		[1]
	(c) (iii)) Valu	e of $N_2 \ge N_1$.		[1]
		Evid	ence of repeats for N_1 or N_2 either here or in (b)(iii) .		[1]
	(d) Co	orrect o	calculation of <i>F</i> .		[1]
	`´ S∈	econd v	value of L . values of N_2 and N_1 . (average) value of N_1 > first (average) value of N_1 .		[1] [1] [1]
	(f) (i)) Two	values of <i>k</i> calculated correctly.		[1]
	(ii)	Justi	ification of s.f. in k linked to significant figures in L and (k	$N_1 - N_2$) and m .	[1]
	(iii)		sible comment relating to the calculated values of <i>k</i> sified by the candidate.	r, testing again	st a criterion [1]

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(g)

	(i) Limitations 4 max.	(ii) Improvements 4 max.	Do not credit
A	two readings not enough (to draw a conclusion)	take more readings <u>and plot a</u> <u>graph</u> /calculate more <i>k</i> values and compare	repeat readings/few readings/only one reading/take more readings and average k
В	friction at pulley	method of reducing friction of pulley with location	
С	wet string added to force/ mass of string not accounted for	waterproof/nylon/wire	
D	can only measure to nearest 0.4g/paperclip	use smaller masses e.g. half paperclips, riders, graph paper	newton meter
E	change in <i>N</i> are very small	reasoned explanation for changing length of wire	helpers parallax errors
F	copper wire is not flat/straight/exit not parallel to water level	circular wire shape	change liquid/wire

[Total: 20]