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.



Page 2	2	Mark Scheme	Syllabus	Paper
_		GCE AS/A LEVEL – May/June 2013	9702	35
(a) (ii)		e of T in range $0.4 \le T \le 1.4$ s. ence of repeats.		[1] [1]
		of readings of m and t (or T) scores 5 marks, four sets s n Supervisor -1 .	cores 4 marks e	etc. [5]
Ra	nge o	f m : Δm ≥ 0.600 kg		[1]
Eac The cor	ch col e pres oventic	headings: umn heading must contain a quantity and a unit. entation of quantity and unit must conform to accepted on e.g. $1/T^2/s^{-2}$. llow $1/T^2(s)^2$	scientific	[1]
	nsiste value:	ncy: s of raw <i>t</i> must all be given to the nearest 0.1s or 0.01s	i.	[1]
Sig	nifica	nt figures: nt figures for every row of values of 1/ \mathcal{T}^2 same as or one s recorded in table.	e greater than	[1]
	lculati lues o	on: f 1/ <i>T</i> ² calculated correctly		[1]
(c) (i)	Sens Scal both Scal	s: sible scales must be used, no awkward scales (e.g. 3:10) es must be chosen so that the plotted points occupy at x and y directions. es must be labelled with the quantity that is being plotte e markings should be no more than three large squares	least half the gr ed.	[1] aph grid in
	All o Dian	ing of points: bservations in the table must be plotted. neter of points must be ≤ half a small square (no "blobs' k to an accuracy of half a small square.	').	[1]
		lity: oints in the table must be plotted (at least 5) for this material to must be less than 0.1s^{-2} of $1/T^2$ from a straight line.	ark to be award	[1] ed. Scatter of
(ii)	Judg Ther Allov	of best fit: ge by balance of all points on the grid about the candida re must be an even distribution of points either side of the v one anomalous point only if clearly indicated (i.e. circle didate. Line must not be kinked or thicker than half a sn	ne line along the ed or labelled) b	full length.
(iii)	The	dient: hypotenuse of the triangle must be at least half the leng read-offs must be accurate to half a small square in bo		

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Page 3		Mark Scheme	Syllabus	Paper
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		y-intercept: Either: Correct-read off from a point on the line and substituted into Read-off must be accurate to half a small square in both x or: Correct read-off of the intercept directly from the graph.	•	[1]
	(d) Val	ue of $P = \text{candidate's gradient. Value of } Q = \text{candidate's inte}$	rcept.	[1]
	Uni	t for P (kg ⁻¹ s ⁻²) correct and consistent with value and Q (s ⁻²)	[1]
				[Total: 20]
2	. , . ,	Value of L in range $8.0 \le L \le 12.0$ cm with consistent unit to	the nearest mm	n. [1]
	(11)	Absolute uncertainty $1 \le \Delta L \le 3$ mm. If repeated readings have been taken, then the uncertainty Correct method of calculation to get percentage uncertainty		range. [1]
	(b) (iii)	Value of raw N_1 an integer.		[1]
	(c) (iii)	Value of $N_2 \ge N_1$.		[1]
		Evidence of repeats for N_1 or N_2 either here or in (b)(iii) .		[1]
	(d) Co	rect calculation of <i>F</i> .		[1]
	`´ Sed	cond value of L . cond values of N_2 and N_1 . cond (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)	Justification of s.f. in k linked to significant figures in L and	$(N_1 - N_2)$ and m .	[1]
	(iii)	Sensible comment relating to the calculated values of specified by the candidate.	<i>k</i> , testing agair	nst 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]