CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2013 series

9702 PHYSICS

9702/34

Paper 3 (Advanced Practical Skills 2), 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 October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



Page 2			Mark Scheme	Syllabus	Paper		
			GCE AS/A LEVEL – October/November 2013	9702	34		
(a) ((ii)	Valu	e of $h_2 < h_1$, with consistent unit.		[1]		
(b) (i	(b) (iv) First values of L_A and L_B , with unit, and value of $L_A - L_B$ in range 1.0 to 6.0 cm.						
	Six sets of values for x , L_A and L_B scores 5 marks, five sets scores 4 marks etc. Incorrect trend -1 . Help from Supervisor -1 .				[5]		
İ	Rar	ige: x	values must include 20.0 cm or less and 80.0 cm or mo	re.	[1]		
l	Column headings: Each column heading must contain a quantity and a unit where appropriate. The unit must conform to accepted scientific convention, e.g. x /cm or x (cm).						
	Consistency of presentation of raw readings: All values of <i>x</i> must be given to the nearest mm.				[1]		
	Significant figures: Every value of $(L_A-L_B)/C$ must be given to the same s.f. as (or one more than) the least s.f. in C or in (L_A-L_B) .				[1]		
(Cal	culati	on: $(L_A-L_B)/C$ calculated correctly.		[1]		
(d)	(i)	Scal grid Scal	s: sible scales must be used, no awkward scales (e.g. 3:10 es must be chosen so that the plotted points occupy in both <i>x</i> and <i>y</i> directions. es must be labelled with the quantity that is being plotte e markings should be no more than three large squares	at least half the	[1] ne graph		
		All o Dian	ing of points: bservations must be plotted. neter of plotted points must be ≤ half a small square (no s must be accurate to half a small square.	"blobs").	[1]		
		Quality: All points in the table must be plotted for this mark to be scored. All points must be within ± 4 scale cm, on the <i>x</i> –axis, of a straight line.					
((ii)	Judg 5 po the f	of best fit: ge by balance of all points on the grid about the ca ints). There must be an even distribution of points eithe full length. Allow one anomalous point only if clearly indic must not be kinked or thicker than half a small square.	er side of the li	ne along		

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		(iii)	The Both	dient: hypotenuse must be at least half the length of the drawn read-offs must be accurate to half a small square in bo method of calculation must be correct.		[1] ons.
			Eithe Corr Rea Or:	rect 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	-	[1]
	Correct read-off of the intercept directly from the graph. (e) Value of <i>a</i> = candidate's gradient and value of <i>b</i> = candidate's intercept. A value presented as a fraction is not allowed.		·	[1]		
				units for a (e.g. cm ⁻¹) and b (no unit), and gradient in ran $a = -0.150 \text{cm}^{-1} (-5.0 \text{to} -15.0 \text{m}^{-1})$.	ge	[1]
				, ,		
						[Total: 20]
2	(a)	(i)		value(s) for <i>d</i> to nearest 0.1 mm or nearest 0.01 mm. range 10.0 to 15.0 mm.		[1] [1]
		(ii)	Corr	rect calculation of <i>R</i> .		[1]
	(b)	Val	id jus	tification for s.f. in <i>R</i> based on s.f. in <i>d</i> and <i>D</i> .		[1]
	(d)	(iv)		range 10° to 50° , with unit. Raw reading(s) must be intelence of repeated readings of θ .	ger value(s).	[1] [1]
	(e)			e of percentage uncertainty based on an absolute uncertainty based on a based		[1]
	(f)	Sec	ond v	values for d and D . value of θ . Second θ less than first θ .		[1] [1] [1]
	(g)	(i)	Corr	rect calculation of two values of <i>k</i> .		[1]
	.3,	(ii)		sible comment relating to the calculated values of k , test rion specified by the candidate.	ing against a	[1]

Mark Scheme

Syllabus

Paper

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Page 4	Mark Scheme	Syllabus	Paper
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(h)

	(i) Limitations (4 max)	(ii) Improvements (4 max)	Do not credit
Α	Two readings are not enough (to draw a valid conclusion)	Take many <i>R</i> values and plot a graph/ calculate more <i>k</i> values and compare	'few readings'/ 'take more readings and calculate average'/'only one reading'
В	Spool does not roll straight/ spool topples over/ jerky motion	Roll spool between guides/ use wider spool	Lubricate bench or spool
С	Difficult to judge θ as it varies, equilibrium position not maintained		
D	Difficult to measure θ due to parallax	Method to reduce parallax (e.g. shadow method)	
E	Difficult to pull thread when measuring θl difficult to watch spool and protractor at same time	Specified thread guiding method (e.g. pulley or rod)	
F	Difficult to align thread with centre of protractor	Take photo or video and measure θ on image (e.g. photo or screen)	
G	Difficult to make protractor vertical	Use plumb-line/detail of another sensible method (e.g. use set square on bench)	

Do not allow 'repeated readings' Do not allow 'use a computer to improve the experiment'

[Total: 20]