CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2014 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 May/June 2014 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 – May/June 2014	9702	34
(a)	(i)	Valu	ie for θ in range 80° to 100°, with unit.		[1]
(b)	(ii)	Valu	ue for <i>t</i> in range 10 to 40 s, with unit		[1]
		Evid	lence of repeat readings of t.		[1]
(c)			s of values for θ and t scores 4 marks, four sets scores trend –1. Help from Supervisor –1.	3 marks etc.	[4]
		nge: alues	must include 75° or less and 105° or more.		[1]
	Column headings: Each column heading must contain a quantity and an appropriate unit. The presentation of quantity and unit must conform to accepted scientific convention			[1] c	
	e.g. t^2/s^2 or $t^2(s^2)$, $\theta(^\circ)$ or $\theta(\deg)$ etc. $\sin^2(\theta/2)$ must have no unit.				
	Consistency: All values of <i>t</i> must be given to the nearest 0.1 s, or all to the nearest 0.01 s.			[1]	
	Significant figures: Every value of t^2 must be given to the same s.f. as (or one greater than) the s.f. in the corresponding t .			[1]	
	Calculation: Values of $\sin^2(\theta/2)$ calculated correctly.			[1]	
(d)	(i)	Scal grap Scal	s: sible scales must be used, no awkward scales (e.g. 3: les must be chosen so that the plotted points occup th grid in both <i>x</i> and <i>y</i> directions. les must be labelled with the quantity that is being plott le markings must be no more than three large squares	y at least half the ed.	[1] e
		Dian	ting: bservations in the table must be plotted on the grid. neter of plotted points must be ≤ half a small square (n ting must be accurate to half a small square.	o "blobs").	[1]
			lity: points in the table must be plotted (at least 5) for this matter of points must be within $\pm 20 \mathrm{s}^2$ of a straight line in		

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Page 3		Mark Scheme	Syllabus	Paper
		GCE AS/A LEVEL – May/June 2014	9702	34
()	Judg 4 po Ther full le Allov	of best fit: ge by balance of all points on the grid about the candi- ints). The must be an even distribution of points either side of ength. The wone anomalous plot only if clearly indicated by the ca- must not be kinked or thicker than half a small square	f the line along the	
()	 (iii) Gradient: The hypotenuse of the triangle must be at least half the length of the drawn line. Both read-offs must be accurate to half a small square in both x and y directions. 			
	Eithe Corr must Or:	ercept: er: ect read-off from a point on the line substituted into <i>y</i> t be accurate to half a small square in both <i>x</i> and <i>y</i> dire ect read-off of the intercept directly from the graph.		[1] off
(e) q = 0	cand	idate's gradient and p = candidate's intercept.		[1]
Corr	rect u	units for q and p (s ² for q and s ² for p).		[1]

[Total: 20]

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		GCE AS/A LEVEL -	May/June 2014	9702	34
2	(a) <i>r</i> in r	nge 5.0 mm to 12.0 mm and to ne	arest 0.1 mm or better.		[1]
	(b) (i)	alue for <i>l</i> in range 61.0 mm to 65.	0 mm.		[1]
	(ii)	alue for e in range 6.0 mm to 8.0	mm.		[1]
	` , ` ,	alue for <i>x</i> . vidence of repeat readings of <i>x</i> .			[1] [1]
		bsolute uncertainty in x in range in repeated readings have been that the range (but not zero) only if orrect method of calculation to observe the contract method of calculations are contract.	aken, then absolute unce working is shown.	•	[1] e
	` ,	alculated value of $ heta$ correct. given to 2 or 3 significant figures			[1] [1]
	(d) Seco	nd values of <i>e</i> and <i>x</i> .			[1]
	(e) (i)	wo values of k calculated correct	y.		[1]
		oth values for k in range 0.80 to	1.20.		[1]

(ii) Valid comment consistent with the calculated values of k, testing against a

criterion specified by the candidate.

Mark Scheme

Syllabus

Paper

[1]

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Page 5	Mark Scheme	Syllabus	Paper
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(f)	Limitations (4 max)	Improvements (4 max)	Do not credit
А	Two readings are not enough to draw a valid conclusion	Take more readings and plot graph / take more readings and compare <i>k</i> values	Repeat readings/ too few readings/ two readings
В	Difficult to align groove with line / difficult to estimate centre of groove	Mark centre line of groove/ method of aligning groove (e.g. use lines on paper/use graph paper/ transparent ramp)	
С	e is small so uncertainty in e is large/ small change in e gives large change in θ	Use larger spheres <u>to</u> <u>enable larger e</u>	Just "use larger spheres"
D	Parallax error <u>when</u> <u>measuring x</u>	Use set square (with detail of workable method)	
Е	Difficult to locate centre of sphere when measuring <i>x</i>	Measure to edge of sphere and add <i>r</i>	Difficult to locate centre of sphere when measuring <i>r</i>
F	Sphere rolls slightly after hitting tape/ sphere does not stick	Use video with scale (in view)/ Description of workable improvement (e.g. powder on strip/plasticine surface)	High speed camera/ slow motion camera/ video camera/ stickier surface/ magnets

[Total: 20]