UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

9702 PHYSICS

9702/32

Paper 32 (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 must be read in conjunction with the question papers and the report on the examination.

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CIE is publishing the mark schemes for the October/November 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



Page 2		je 2	Mark Scheme: Teachers' version	Syllabus	Paper
			GCE A/AS LEVEL – October/November 2009	9702	32
(a	a)	First valı	ue for <i>h</i> to nearest mm		[1
(b		Four ma	ements table rks for six sets of readings for <i>m</i> and <i>h</i> , rive sets, etc. (–1 if trend is positive, –1 if help from su	pervisor)	[4
	,	Table – range Values of m must be $\geq 10\mathrm{g}$ and $\leq 100\mathrm{g}$. Values must include 10 or 20 g and 90 or 100 g with no interval greater than 20 g.			
		Each co Ignore u There m	column headings lumn heading must contain a quantity and a unit where nits in the body of the table. nust be some distinguishing mark between the quant		[1 (i.e. solidus is
	(expected	d, but accept, for example, $m(g)$).		
			consistency of presentation of raw readings es of <i>h</i> must be given to the same number of decimal plants.	aces.	[1
(c	;)	Sen Sca both Sca Allo	aph) Axes – sible scales must be used. Awkward scales (e.g. 3:10) les must be chosen so that the plotted points occupy a x and y directions. les must be labelled with the quantity which is being play w reversed axes but do not allow wrong graph. be between labels must not be greater than three large	t least half the g	raph grid in
		All c Ring half	aph) Plotting – observations must be plotted. g and check a suspect plot. Tick if correct. Re-plot if inc a small square from the correct position). not allow plots with diameter greater than half a small s		[1 is more than
		Jud The	aph) Line of best fit – ge by scatter of at least 5 trend plots about the candida re must be a fair scatter of points either side of the line cate best line if candidate's line is not the best line.		[1
		Jud All p	aph) Quality of results – ge by scatter of points about a best fit line points in the table (which must be at least 5) must be w ight line.	ithin 0.5 ' <i>h</i> -scale	[1 cm' of a

Do not award if wrong trend.

(ii) Gradient -

The hypotenuse must be at least half the length of the drawn line.

[1]

Read-offs must be no more than half a small square from the line (if incorrect, write in correct value). [1]

Check for $\Delta y/\Delta x$.

Check value is consistent with trend.

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Measurement – value for raw d in range 18.00 to 27.00 mm (or SV ± 2.00 mm), and given to nearest 0.1 mm or nearest 0.01 mm. Unit must be given.	[1]
Measurement – repeated readings for <i>d</i> .	[1]
A calculated correctly. Allow ecf. Check value. Penalise power of ten error. If incorrect, write in the correct value.	[1]
S.f. in A the same as or one more than the s.f. in raw d.	[1]
nalise sign error. Solution of the sign error of the sign error of the sign error. Solution of the sign error of the sign error of the sign error of the sign error of the sign error.	[1] [1]
	given to nearest 0.1 mm or nearest 0.01 mm. Unit must be given. Measurement – repeated readings for <i>d</i> . A calculated correctly. Allow ecf. Check value. Penalise power of ten error. If incorrect, write in the correct value.

[Total: 20]

			GCE A/AS LEVEL – October/November 2009	9702	32
(a)			<i>l</i> , with unit, to nearest mm. lp, then –1.		[1]
(b)	(i)	First	t value of <i>a</i> (≤ 25 cm)		[1]
	(ii)	First	t value of b (less than a)		[1]
(c)	(i)	Plac	e named item as marker for rebound distance/ ce ruler under path and view vertically from above/ e second brick as releasing point.		[1]
	(ii)	If re othe	centage uncertainty in <i>b</i> epeated readings have been done then the uncertaind erwise absolute uncertainty must be at least 2 mm and no rect ratio idea required.	•	•
(d)	Firs	st valu	ue of k substitution correct and value <1. There must be	no unit.	[1]
	S.f.	in va	alue of k – must be 2 or 3 s.f. (but allow 4 s.f. if <u>all</u> raw da	ata is to 3 s.f.)	[1]
(e)	Sec	cond v	values of a and b.		[1]
	Evi	dence	e of repeat readings for first or second value of b		[1]
	Sec	cond v	value of b shows correct trend.		[1]
(f)	Cal	culati	ion of % difference (or equivalent) in <i>k</i> values.		[1]
			onclusion based on the two values of k (e.g. k is consent with 20% difference as border between 'close' and		,

Mark Scheme: Teachers' version

Syllabus

Paper

[1]

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has defined his own % difference.

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(g) Identifying limitations and improvements

	(g) (i) Difficulties (one from each box – max. 4)	(g) (ii) Improvements (one from each box – max. 4)	But <u>not</u>
А	Two sets of readings not enough.	Take more readings and plot a graph / calculate more <i>k</i> values.	Repeated readings.
В	Difficult to judge rebound point/distance because of movement / short static time.	Use video with slow playback / use position sensor to measure rebound / use sound of ball striking a block to judge rebound / use lightgate and refine its position.	Use computer or data logger / attach pointer to ball / change length of string / time rebound instead of measuring.
С	Difficult to release without exerting a force/movement.	Named, <u>realistic</u> method of release without a force (e.g. remote-controlled clamp).	
D	Parallax error in measuring rebound distance.	Observe shadow on screen.	View at eye level.
Е	Inconsistent bounce / ball bounces at an angle.	Use smoother brick.	Use heavier ball.
F	Motion affected by air movement / ball swings around.	Turn off fans or air con / shield from draughts.	Air resistance / carry out in vacuum / constraining guides.
G	When measuring <i>l</i> it is difficult to judge centre of ball.	Suitable method for measuring diameter of ball.	

[8]

[Total: 20]