UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2008 question paper

9702 PHYSICS

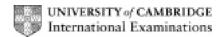
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Paper 32 (Advanced Practical Skills 2), maximum raw mark 40

Mark schemes must be read in conjunction with the question papers and the report on the examination.

CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the October/November 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



Page 2		ge 2	Mark Scheme	Syllabus	Paper	
			GCE A/AS LEVEL – October/November 2008	9702	32	
1 (a)	(ii) Mea	asurement of θ . $5 \le \theta \le 10^{\circ}$ Ignore d.p.			[1]
(b)	Help giv	of readings scores 6 marks, five sets scores 5 marks, etc. en, -1 (e.g. putting plumbline into position). ly wrong trend, -1 . Allow $n = 0$.			[6]
			Maximum angle $\theta_{\text{max}} \ge 45^{\circ}$.			[1]
		Table he	eadings. θ /° θ (°) No unit for 1/cos θ .			[1]
			ency in raw data – all values of θ given to the nearest 1° or	0.5°.		[1]
		Calculat	ed quantities. Allow small rounding errors. the specified value of $1/\cos\theta$ and tick if correct.			
			d value is the largest value of θ .			[1]
		•	int figures. ues of 1/cos $ heta$ should be to the same s.f. as (or one more the	an) the raw valu	e of θ .	[1]
		•	of data. close to Examiner's straight line. rend/curved trend – no mark.			[1]
(c)	(not 3, 6	hould occupy at least half the grid in both directions and sca , 9 or other awkward) and labelled with a quantity. enalise reversed axes. Label FO. Ignore units.	ales should be s	sensible	[1]
		All tabula Do not a	nat one point is correctly plotted (error ≤ half a small square ated results to be plotted on graph grid. Illow blobs (points ≥ half a small square). Correct indicate correct position.	∍).		[1]
			pest fit. 5 trend plots. Allow curved trend. For thick lines (≽ half a small square). No kinks.			[1]
(d)	Read-off	t. chosen for gradient as a hypotenuse at least half the lengt fs are on the line correct to within half a small square and c t mark = 0 if curve used. If wrong write in correct read-off. C	orrect substitution	on.	[1]
			t calculated by a correct method or using the graph. extrapolation for curve at $n = 0$ (i.e. do not allow algebraic	errors with y = ı	mx + c).	[1]
(e)	Correct	method and substitution. k equal to $\left(\frac{\text{gradient}}{2m}\right)$.			[1]
		Method : M = interest Allow e.d	and value of <i>M</i> within 50% of Supervisor's value.			[1]

[Total: 20]

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(b) (i) Measurement of l 19.0 $\leq l \leq$ 21.0 cm. Ignore d.p. Supervisor's help -1. [1] (ii) Correct method of estimation of percentage uncertainty. $\Delta l = 1$ mm or 2 mm or half the range. [1] (iii) Correct calculation of first value of l^3 (20° = 8000). If incorrect write in correct value. Accept small rounding errors. [1] (iv) Justification for s.f. for l^3 . Same or one more than the raw value of l. Consistent with their own data. [1] (c) Measurement of T. $0.2 \le T \le 2.0 \text{ s}$ [1] (c) or (d) Measurement of raw *t* to the nearest 0.1 s or 0.01 s. [1] [1] Evidence of repeat readings of *t*. Evidence of $n \ge 10$ oscillations. [1] (d) Measurement of second *l* to nearest mm. [1] Measurement of second $T_{(d)} < T_{(c)}$. Penalise wrong trend. (e) Correct method and calculation of k values. [1] Valid comment on whether equation applies to results. [1]

Allow e.c.f. on arithmetic errors of *k* values. Evidence of correct ratio for one value of *k* is necessary to access this mark. *k* values within 10% to support relationship. Allow up to 20% if

candidate stated a value.

(f)	(i) Problems [4]	(f) (ii) Improvements [4]
\mathbf{A}_{p}	Not enough readings (to draw a conclusion).	A _s More readings <u>and</u> plot a graph.
B _p	Time too fast/moves too fast/error in timing large compared to time measured.	B _{s 1} Video recorder, playback frame by frame/ slow motion with timer/stroboscope with scale.
		B _{s 2} Longer hacksaw blade/heavier mass (to increase time of oscillation)/more oscillations than already used (larger <i>n</i>).
Cp	Judging beginning/end of oscillation/complete oscillation.	C _s Motion/position sensor placed at side of mass/fiducial marker/(stationary) reference marker and stated purpose.
Dp	Length error e.g. parallax error in reading the ruler/difficulty in establishing centre of mass/ ends of blocks.	D _s Find the mid-point of the mass by finding the distance to both ends and taking an average/ thinner rule with reason/scale starts at 0 cm with reason/scale on blade/corrections for parallax error.
Ep	Difficulty in setting up the apparatus horizontally/difficulty in assembly with detail.	E _s Use spirit level/measure up from bench/ partner to help with <u>set up.</u>

[Total: 20]