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

9702/22

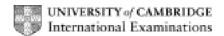
Paper 22 (AS Structured Questions), maximum raw mark 60

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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				GCE A/A	S LEVE	L – Oct	ober/Novemb	er 2009	9702	22	
1	(a)	(i)	either	1.55%	or	1.6%	(not 1.5 or	2)		A1	[1]
		(ii)	either	1.09%	or	1.1%	(not 1.0 or	1)		A1	[1]
	(b)		swer of { ner 4.2				er of sig. fig.			A1	[1]
	(c)	(i)					ant figures tha nore than 2 s.f		ess)	B1	[1]
		(ii)									[2]
				,						[Tota	
2	(a)	(i)	the		rgy requi	ired to m		nt tempera	ture	B1	[1]
		(ii)	bo e.g. ev	oiling takes aporation	s place ir occurs a	n body of at all tem	f the liquid peratures			B1 B1	[4]
	(b)	(i)	volume	$e = (\frac{48}{4.5})$	=) 10.7	cm³				A1	[1]
		(ii)	= 1.8	me = 10. × 10 ⁻²³ cm aration =	3					A1	[1]
										A1	[1]
										[Tota	al: 8]
3	(a)	(i)	speed	= 4.0 m	s ⁻¹ (á	allow 1 s	.f.)			A1	[1]
		(ii)	v = 6	2 × 9.8 × 1.							[1]
	(b)	spe at (ed = (33 ± 2)°	7.4 ± 0.2) to the ver	m s ⁻¹ rtical				the diagram – n	A1 A1	[3] ed)

Mark Scheme: Teachers' version

Syllabus

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	(c)	(i)	either $v^2 = 2 \times 9.8 \times 0.98$ or $v = 6.2 / \sqrt{2}$		C1 A1	[2]
		(ii)	1 momentum = mv		C1 A1	[3]
			= 3.0 N(allow 1 s.f.)		A1	[2]
					[Total:	12]
4	(a)		lity to do worka result of a change of shape of an object/stretched etc			[2]
	(b)	eith or F =	rk = average force ×distance moved (in direction of the force) ner work = ½ × F × x work is area under F/x graph which is ½Fx kx work / energy = ½kx²		B1 B1	[3]
	(c)	(i)	spring constant = $\frac{3.8}{2.1}$			[1]
		(ii)	1 $\Delta E_P = mg\Delta h$ or $W\Delta h$		C1	
			$= 0.057 \text{ J}$ $= 0.057 \text{ J}$ $2 \Delta E_{\text{S}} = \frac{1}{2} \times 1.8 \times 10^{2} (0.036^{2} - 0.021^{2}) \dots$		A1 M1	[2]
			= 0.077 J			[1]
			$= 0.020 \text{ J} \qquad (allow e.c.f. if \Delta E_{S} > \Delta E_{P})$		A1	[1]
					[Total:	: 10]

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Syllabus

Paper

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5	(a)	(i)	freque	ency f				B1	[1]	
		(ii)	amplit	ude <i>A</i>				B1	[1]	
	(b)	π rac	d or 18	80°(unit :	necessary)			B1	[1]	
	(c)	(i)	(i) speed = $f \times L$							
		` '			/ at P			B1		
					cted waves interfeing in opposite dire			M1		
			speed	is the speed of in	cident or reflected	wave / one of the	ese waves	A1	[3]	
								[Tota	l: 7]	
6	(a)	total resistance in series = $2R$ total resistance in parallel = $\frac{1}{2}R$ M ratio is $2R / \frac{1}{2}R = 4$ (allow mark if clear numbers in the ratio)							[1]	
	(b)	at 1.	at 1.5 V, current is 0.10 AC1							
		resis	resistance = $V/I = \frac{1.5}{0.1}$							
		= 15 ΩA1								
		(use of tangent or any other current scores no marks)								
	(c)									
	(-)			p.d. across each lamp / V	resistance of each lamp / Ω	combined resistance / Ω				
		serie para		1.5 3.0	15 20	30 10				
	ļ									
		column 1							[4]	
	(d)	(i)	ratio is	s 3(allo	w e.c.f.)			A1	[1]	
		(ii) resistance increases as potential difference increases								
		increasing p.d. increases currentB1 current increases non-linearly so resistance increasesB1							[3]	
					-			[Total:		

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7	(a)	a) either forms of same element or atoms / nuclei with same number of protons atoms / nuclei contain different numbers of neutrons (use of 'element' rather than atoms / nuclei scores max 1 mark) b) (i) decay is not affected by environmental factors (allow two named factors)								[2]
	(b)									[1]
		(ii) eit or	ther		-	(of a nucleus) cann onstant probability i	•	dicted time	B1	[1]
	(c)	¹⁸⁵ ₇₅ Re							B1	
		either	0 -1	or	$_{-1}^{0}\beta$				B1	[2]

[Total: 6]