## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE A/AS Level

## MARK SCHEME for the November 2005 question paper

## 9702 PHYSICS

9702/02 Paper 2 maximum raw mark 60

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

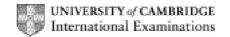
All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

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

CIE is publishing the mark schemes for the November 2005 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



	Page 1		Mark Scheme Syllabus		www.xtrapape	
			GCE A/AS LEVEL – November 2005	9702	2	
1	(a)	(i)	force per unit area (ratio idea essential)		B1	
		(ii)	kg m <sup>-1</sup> s <sup>-2</sup>		B1	[2]
	(b)		ho has base unit kg m <sup>-3</sup> $g$ has base unit m s <sup>-2</sup> $h  ho g$ has base unit m $ imes$ kg m <sup>-3</sup> $ imes$ m s <sup>-2</sup> same as pressure QED		B1 B1 M1 A0	[3]
2	(a)		point where whole weight of body (allow r may be <u>considered</u> to act (do not allow 'ac		M1 A1	[2]
	(b)		when CG below pivot, weight acts through (so) weight has no turning effect about pi	•	B1 B1	[2]
3	(a)		change in velocity/time (taken)		B1	[1]
	(b)		velocity is a vector/velocity has magnitude direction changing so must be accelerating		B1 B1	[2]
	(c)		so no resultant vertical force t 6.1 sin35 = 3.5 N	or scale shown riangle of correct shap resultant = $3.5 \pm 0.2 \text{ N}$ norizontal $\pm 3^{\circ}$	B1 e B1 B1 B1	[4]
			allow answer based on centripetal force: resultant is centripetal force (which is hori resultant is horizontal component of tension 6.1 sin35 = 3.5 N horizontally		(B1) (B1) (B1) (B1)	
4	(a)	(i)	use of tangent at time $t = 0$ acceleration = $42 \pm 4$ cm s <sup>-2</sup>		B1 A1	[2]
		(ii)	use of area of loop distance = $0.031 \pm 0.001$ m allow 1 mark if $0.031 \pm 0.002$ m)		B1 B2	[3]
	(b)	(i)	F = ma		C1	
			= 0.93 × 0.42 {allow e.c.f. from (a)(i)} = 0.39 N		A1	[2]
		(ii)	force reduces to zero in first 0.3 s then increases again in next 0.3 s in the opposite direction		B1 M1 A1	[3]

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5	(a)		similarity: e.g. same wavelength/frequency/period, constant phase difference	B1	
			difference: e.g. different amplitude/phase (do not allow a reference to phase for both similarity and difference)	B1	[2]
	(b)		constant phase difference so coherent	B1	[1]
	(c)	(i)	intensity ∝ amplitude²	C1	
			$I \propto 3^2$ and $I_{\rm B} \propto 2^2$ leading to $I_{\rm B} = \frac{4}{9}I$	M1 A0	[2]
		(ii)	resultant amplitude = $1.0 \times 10^{-4}$ cm resultant intensity = $\frac{1}{9}I$	C1 A1	[2]
	(d)	(i)	displacement = 0	B1	[1]
		(ii)	$x_A = -2.6 \times 10^{-4}$ cm and $x_B = +1.7 \times 10^{-4}$ cm allow $\pm 0.5 \times 10^{-4}$ cm)	C1	
			resultant displacement = (-) $0.9 \times 10^{-4}$ cm	A1	[2]
6	(a)		force must be upwards (on positive charge) so plate Y is positive	M1 A1	[2]
	(b)	(i)	E = V/d = 630/(0.75 × 10 <sup>-2</sup> )	C1	
			$= 8.4 \times 10^4 \text{ N C}^{-1}$	A1	[2]
		(ii)	qE = mg $q = (9.6 \times 10^{-15} \times 9.8) / (8.4 \times 10^4)$ $= 1.12 \times 10^{-18} \text{ C}$	C1 C1	<b>101</b>
			= 1.12 × 10 ° C	A1	[3]
7	(a)		either $V = E R_1 / (R_1 + R_2)$ or $I = E / (R_1 + R_2)$	C1	
			$= \frac{1800}{3000} \times 4.50$ $= 2.70 \text{ V}$ $= 2.70 \text{ V}$ $= 2.70 \text{ V}$	M1	[2]
		<i>a</i> n		A0	[2]
	(b)	(i)	for a wire, $V = I \times (\rho L/A)$ $I, \rho$ and $A$ are constant	M1 A1	
			so V ∝ L	A0	[2]

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		(ii)	<b>1</b> 2.70 V	A1	[1]
			$2 \frac{L}{100} = \frac{2.70}{4.50}$	C1	
			L = 60.0  cm	A1	[2]
		(iii)	thermistor resistance decreases as temperature rises so QM is shorter	M1 A1	[2]
}	(a)		product of force and distance moved in the direction of the force	M1 A1	[2]
	(b)	(i)	falls from rest decreasing acceleration reaches a constant speed	B1 B1 B1	[3]
		(ii)	straight line with negative gradient $y$ -axis intercept above maximum $E_K$ reasonable gradient (same magnitude as that for $E_K$ initially)	B1 B1 B1	[3]

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