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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2006 question paper

0625 PHYSICS

0625/03

Paper 3 (Extended Theory), maximum raw mark 80

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 instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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 grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

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

CIE is publishing the mark schemes for the October/November 2006 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



(a) (i) t = v/g or 32/10				10002 00111101 2000		
line joining 0,0 and 3.2, 32, accept c.f. from time (i)	1	(a)	(i)			
(b) (i) take volume of water before use (totally) immerse stone and take new volume (Not clearly measured before and after C1) (ii) hang rock from balance and take reading (iii) density = mass/volume (iv) need to tie "sinker" or cork or press cork down need volume with sinker then volume with sinker and cork or just completely submerge cork (iv) need to tie "sinker" or cork or press cork down need volume with sinker then volume with sinker and cork or just completely submerge cork (iv) need to tie "sinker" or cork or press cork down need volume with sinker then volume with sinker and cork or just completely submerge cork (iv) need to tie "sinker" or cork or press cork down need volume with sinker and cork or just completely submerge cork (iv) need to tie "sinker" or cork or press cork down need volume with sinker and cork or just completely submerge cork (iv) need to tie "sinker" or cork or press cork down need volume with sinker and cork or just completely submerge cork (iv) to Q extension proportional to extension or in terms of doubling (c) (up to Q extension proportional to force applied) Q to R extension/unit force more however expressed (d) k = force/extension or 8/2 or other correct ratio = 4.0 N/mm (ii) p.e. lost = mgh or 1 x 10 x 7 = 70 J A1 (b) 70 = 0.5 x m x v² or ecf v² = 140 or 2 x p.e. v = 12 m/s (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion (iii) more heat lost at higher temperature (b) heat in = 60 x 210 or Wt or 12 600 (J) heat in water = m x s x λ θ or 75 x s x 40 s = 12800/75 x 40 c1 s = 12800/75 x 40 c1 s = 12800/75 x 40 c1 c2 outline correct, two wires with clear junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals			(ii)			
(totally) immerse stone and take new volume (Not clearly measured before and after C1) (ii) hang rock from balance and take reading (iii) density = mass/volume (iv) need to tie "sinker" or cork or press cork down need volume with sinker then volume with sinker and cork or just completely submerge cork [Itotal: 2 (a) limit of proportionality (allow elastic limit) (b) force is proportional to extension or in terms of doubling (c) (up to Q extension proportional to force applied) Q to R extension/unit force more however expressed (d) k = force/extension or 8/2 or other correct ratio = 4.0 N/mm [Itotal: 3 (a) p.e. lost = mgh or 1 x 10 x 7 = 70 J (b) 70 = 0.5 x m x x² or ecf			(iii)			[5]
(iii) density = mass/volume (iv) need to tie "sinker" or cork or press cork down need volume with sinker then volume with sinker and cork or just completely submerge cork B1		(b)	(i)	(totally) immerse stone and take new volume		
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Read volume with sinker then volume with sinker and cork or just completely submerge cork ITotal:			(iii)	density = mass/volume	B1	
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(b) force is proportional to extension or in terms of doubling (c) (up to Q extension proportional to force applied) Q to R extension/unit force more however expressed B1 (d) k = force/extension or 8/2 or other correct ratio = 4.0 N/mm [Total] 3 (a) p.e. lost = mgh or 1 x 10 x 7 = 70 J (b) 70 = 0.5 x m x v² or ecf v² = 140 or 2 x p.e. v = 12 m/s (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion B1 (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion B1 (ii) 1 is 20°C 2 is 15 ± 1°C, need both correct for a mark (iii) more heat lost at higher temperature B1 (b) heat in = 60 x 210 or Wt or 12 600 (J) heat in water = m x s x Δθ or 75 x s x 40 s = 12600/75 x 40 = 4.2 J/g °C A1 (c) outline correct, two wires with clear junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals A1	2	(-)	linait	of managita (allow alastic limit)	_	_
(c) (up to Q extension proportional to force applied) Q to R extension/unit force more however expressed (d) $k = force/extension or 8/2 \text{ or other correct ratio} = 4.0 \text{ N/mm}$ (a) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (b) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (b) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (d) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (e) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (f) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (f) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) some $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (b) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (d) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (e) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (f) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (d) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (e) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (f) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (c) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (d) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (e) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (f) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 7 = 70 \text{ J}$ (h) $p.e. lost = mgh \text{ or } 1 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10 \times 10 \times$	2					[1]
Q to R extension/unit force more however expressed (d) $k = force/extension or 8/2 or other correct ratio = 4.0 N/mm$ [Total] 3 (a) p.e. lost $= mgh \text{ or } 1 \times 10 \times 7$ $= 70 \text{ J}$ (b) $70 = 0.5 \times m \times v^2$ or ecf $v^2 = 140 \text{ or } 2 \times \text{ p.e.}$ $v = 12 \text{ m/s}$ (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion [Total] 4 (a) (i) 1 is 20°C $2 \text{ is } 15 \pm 1^{\circ}\text{C}$, need both correct for a mark (ii) more heat lost at higher temperature (b) heat in $= 60 \times 210 \text{ or } Wt \text{ or } 12 600 \text{ (J)}$ heat in water $= m \times s \times \Delta\theta \text{ or } 75 \times s \times 40$ $s = 12600/75 \times 40$ $= 4.2 \text{ J/g °C}$ (c) outline correct, two wires with <u>clear</u> junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals					B1	[1]
$= 4.0 \text{ N/mm} \hspace{1cm} \text{ITotal}$ $3 \hspace{1cm} \text{(a)} \hspace{1cm} \text{p.e. lost} \hspace{1cm} = \text{mgh or } 1 \times 10 \times 7 \hspace{1cm} \text{C1} \hspace{1cm} \text{A1}$ $(b) \hspace{1cm} 70 = 0.5 \times m \times v^2 \text{ or ecf} \hspace{1cm} \text{C1} \hspace{1cm} \text{A1}$ $(c) \hspace{1cm} \text{some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion} \hspace{1cm} \text{B1}$ $(c) \hspace{1cm} \text{some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion} \hspace{1cm} \text{ITotal}$ $4 \hspace{1cm} \text{(a)} \hspace{1cm} \text{(i)} \hspace{1cm} 1 \text{ is } 20^{\circ}\text{C} \hspace{1cm} 2 \text{ is } 15 \pm 1^{\circ}\text{C}, \text{ need both correct for a mark} \hspace{1cm} \text{A1}$ $(ii) \hspace{1cm} \text{more heat lost at higher temperature} \hspace{1cm} \text{B1}$ $(b) \hspace{1cm} \text{heat in } = 60 \times 210 \text{ or } Wt \text{ or } 12 600 \text{ (J)} \hspace{1cm} \text{heat in water } = m \times s \times \Delta\theta \text{ or } 75 \times s \times 40 \hspace{1cm} \text{C1} \hspace{1cm} \text{S} = 12600/75 \times 40 \hspace{1cm} \text{C1} \hspace{1cm} \text{A1}$ $(c) \hspace{1cm} \text{outline correct, two wires with } \frac{\text{clear junction and a meter/datalogger/computer}}{\text{labels, hot and cold junctions or clear, two different metals} \hspace{1cm} \text{A1}$		(c)			B1	[1]
3 (a) p.e. lost = mgh or 1 x 10 x 7		(d)				[2]
(b) $70 = 0.5 \times m \times v^2$ or ecf $v^2 = 140$ or $2 \times p.e.$ C1 $v = 12$ m/s A1 (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion B1 (a) (i) $1 \text{ is } 20^{\circ}\text{C}$ $2 \text{ is } 15 \pm 1^{\circ}\text{C}$, need both correct for a mark A1 (ii) more heat lost at higher temperature B1 (b) heat in $= 60 \times 210$ or Wt or $12 600$ (J) C1 heat in water $= m \times s \times \Delta\theta$ or $75 \times s \times 40$ C1 $s = 12600/75 \times 40$ C1 $s = 12600/75 \times 40$ C1 $s = 4.2 \text{ J/g}^{\circ}\text{C}$ A1 (c) outline correct, two wires with <u>clear junction</u> and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals					[Tota	al: 5]
$v^2 = 140 \text{ or } 2 \text{ x p.e.}$ C1 $v = 12 \text{ m/s}$ A1 (c) some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion B1 (a) (i) 1 is 20°C 2 is 15 ± 1 °C, need both correct for a mark (ii) more heat lost at higher temperature B1 (b) heat in = 60×210 or Wt or $12 600$ (J) heat in water = $m \times s \times \Delta \theta$ or $75 \times s \times 40$ C1 $s = 12600/75 \times 40$ C1 $s = 4.2 \text{ J/g}$ °C (c) outline correct, two wires with <u>clear</u> junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals	3	(a)	p.e.			[2]
against the motion B1 [Total: 4 (a) (i) 1 is 20°C		(b)	$v^2 =$	140 or 2 x p.e.	C1	[3]
4 (a) (i) 1 is 20°C 2 is 15 ± 1°C, need both correct for a mark A1 (ii) more heat lost at higher temperature B1 (b) heat in = 60×210 or Wt or 12600 (J) C1 heat in water = $m \times s \times \Delta\theta$ or $75 \times s \times 40$ C1 $s = 12600/75 \times 40$ C1 $= 4.2 \text{ J/g}$ °C A1 (c) outline correct, two wires with <u>clear junction</u> and a meter/datalogger/computer A1 labels, hot and cold junctions or clear, two different metals		(c)			B1	[1]
2 is $15 \pm 1^{\circ}$ C, need both correct for a mark (ii) more heat lost at higher temperature B1 (b) heat in = 60×210 or Wt or $12 600$ (J) heat in water = $m \times s \times \Delta \theta$ or $75 \times s \times 40$ S = $12600/75 \times 40$ E1 C1 C1 C1 C1 C1 C1 C1 C1 S = $12600/75 \times 40$ C1 E4.2 J/g °C C1 A1 (c) outline correct, two wires with clear junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals A1					[Tota	al: 6]
(b) heat in = 60×210 or Wt or $12 600$ (J) heat in water = $m \times s \times \Delta \theta$ or $75 \times s \times 40$ C1 $s = 12600/75 \times 40$ C1 $= 4.2 \text{ J/g °C}$ A1 (c) outline correct, two wires with <u>clear junction</u> and a meter/datalogger/computer M1 labels, hot and cold junctions or clear, two different metals A1	4	(a)	(i)		A1	
heat in water = $m \times s \times \Delta \theta$ or 75 x s x 40 C1 $s = 12600/75 \times 40$ C1 $= 4.2 \text{ J/g °C}$ A1 (c) outline correct, two wires with <u>clear junction and a meter/datalogger/computer labels, hot and cold junctions or clear, two different metals A1</u>			(ii)	more heat lost at higher temperature	B1	[2]
labels, hot and cold junctions or clear, two different metals A1		(b)	heat	in water = $m \times s \times \Delta \theta$ or 75 x s x 40 12600/75 x 40	C1 C1	[4]
		(c)				[2]
[Total:					[Tota	al: 8]

Mark Scheme

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Page 2

Paper 03

Syllabus

0625

	,			IGCSE - OCT/NOV 2006	0625	03	
5	(a)	(i)	СО	nduction		B1	
		(ii)		articles/atoms/ions vibrate or electrons move and carry energy as on energy from one particle to the next		B1 B1	[0]
	(b)	suita prec	four surfaces facing <u>one</u> heat source suitable detector e.g. thermometer behind surface-read all 4 precaution e.g. equal distance/time (Can not score last two marks if experiment is totally wrong)				[3]
6	(a)	com	plete	ed path		В1	[1]
	(b)			correct, -1 each incorrect overted, same size as object		B2	[2]
	(c)	angl	e of	incidence zero/at right angles/along normal		B1	[1]
	(d)	1.5 =	= Va	$Vg = 3x \cdot 10^8 / Vg$		C1	
		Vg =	2 x	10 ⁸ m/s		A1	[2]
	(e)	OR a	angl	incidence = 45°, so angle of reflection = 45°, so ray turns through e i> angle c rathernally reflects	90°	B1 B1	[2]
							al: 8]
7	(,			ot same wavelength/same distance apart			
				hould extend into shadow area (more) any 2		B2	[2]
	(b)	with	circ	showing large flat piece ular edges (ignore any wavelength changes) but straight part must slit width	be (very) nearly	M1 A1	[2]
	(c)	spee		= 1.2 x 8 = 9.6 cm/s		C1 A1	[2]
						[Tota	al: 6]
8	(a)	swite	ch in	correct position		B1	[1]
	(b)	(i)	rhe	eostat/variable resistance symbol drawn		B1	
		(ii)	do	at and R in line to 12 W lamp		B1	[2]
	(c)	Que	Question deleted				
	(d)		· V/I · 4Ω	or 12/.3		C1 A1	[2]
	(e)	(i)	pa	rallel circuit/all lamps connected separately across the 12V		B1	
		(ii)	4 /	A		A1	[2]
						[Tota	al: 7]

Mark Scheme

Syllabus

Paper

Page 3

	Page 4		Mark Scheme	Syllabus	Paper		
			IGCSE - OCT/NOV 2006	0625	03		
9	(a)	(i) connections one to each plate top one to +ve , bottom one to -ve (New PSU drawn C1)		M1 A1	[2]		
		(ii)	electrons negatively charged one plate positively charged, one negatively charged electrons attracted to +/repelled by –	I	B1 B1 B1	[3]	
	(b)	(i)	time base applied to X plates stated or described		B1		
		(ii)	a.c. or varying voltage applied to Y plates		B1	[2]	
	(c)	2 full	vaves, (equal about centre line)		B1	[1]	
					[Total: 8]		
10	(a)	A – r	sistor B – LDR C – transistor D – lamp (–1 e	ach incorrect)	B2	[2]	
	(b)	С			B1	[1]	
	(c)	resistance of LDR low in light, high in dark increase of resistance/potential in circuit cause transistor to conduct ($V_{be} > 0.6 \text{ V}$) switches lamp on		B1 B1 B1	[3]		
					[Total	l: 6]	
11	(a)	(i)	atoms interact with by particle/photon not radiation electron(s) removed to form ions		B1 B1		
		(ii)	much greater mass or size/slower speed/more ion pa	airs/cm/larger charge	B1	[3]	
	(b)	(i)	any 2 correct		B2		
		(ii)	 e.g. foil thickness described/outline diagram foil too thick less reading/notes on diagram to show rother examples will occur, must have two clear point e.g. 1. gamma rays aimed at cancer (not just radia focused on tumour 	s: ition)	B1 B1		
			e.g. 2. fission of heavy nucleus (accept named nucleads to more fissions/chain reaction	clide)		[4]	
					[Total	l: 7]	