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.

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1	**(a)**	**(i)**	t = v/g or 32/10	C1	
			= 3.2 s	A1	
		(ii)	straight line starting at zero, inclined	C1	
			line joining 0,0 and 3.2, 32, accept c.f. from time **(i)**	A1	
		(iii)	2.4 kg	A1	[5]
	(b)	**(i)**	take volume of water before use	B1	
			(totally) immerse stone and take new volume	B1	
			(Not clearly measured before and after C1)		
		(ii)	hang rock from balance and take reading	B1	
		(iii)	density = mass/volume	B1	
		(iv)	need to tie "sinker" or cork or press cork down	B1	
			need volume with sinker then volume with sinker and cork or just completely submerge cork	B1	[6]
					[Total: 11]
2	**(a)**		limit of proportionality (allow elastic limit)	B1	[1]
	(b)		force is proportional to extension or in terms of doubling	B1	[1]
	(c)		(up to Q extension proportional to force applied)		
			Q to R extension/unit force more however expressed	B1	[1]
	(d)		k = force/extension or 8/2 or other correct ratio	C1	
			= 4.0 N/mm	A1	[2]
					[Total: 5]
3	**(a)**		p.e. lost = mgh or 1 x 10 x 7	C1	
			= 70 J	A1	[2]
	(b)		70 = 0.5 x m x v^2 or ecf	C1	
			v^2 = 140 or 2 x p.e.	C1	
			v = 12 m/s	A1	[3]
	(c)		some p.e. changed to heat/sound/either one/work done against air resistance air/resistance acts against the motion	B1	[1]
					[Total: 6]
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	[2]
	(b)		heat in = 60 x 210 or Wt or 12 600 (J)	C1	
			heat in water = m x s x $\Delta\theta$ or 75 x s x 40	C1	
			s = 12600/75 x 40	C1	
			= 4.2 J/g °C	A1	[4]
	(c)		outline correct, two wires with clear junction and a meter/datalogger/computer	M1	
			labels, hot and cold junctions or clear, two different metals	A1	[2]
					[Total: 8]

5 **(a)** **(i)** conduction B1

(ii) particles/atoms/ions vibrate or electrons move and carry energy B1
pass on energy from one particle to the next B1 [3]

(b) four surfaces facing one heat source B1
suitable detector e.g. thermometer behind surface-read all 4 B1
precaution e.g. equal distance/time B1
(Can not score last two marks if experiment is totally wrong) [3]

[Total: 6]

6 **(a)** completed path B1 [1]

(b) any two correct, -1 each incorrect
virtual, inverted, same size as object B2 [2]

(c) angle of incidence zero/at right angles/along normal B1 [1]

(d) $1.5 = Va/Vg = 3x\ 10^8/Vg$ C1

$Vg = 2 \times 10^8$ m/s A1 [2]

(e) angle of incidence = 45°, so angle of reflection = 45°, so ray turns through 90°
OR angle i> angle c B1
so totally internally reflects B1 [2]

[Total: 8]

7 **(a)** straight not circular or WTTE
waves not same wavelength/same distance apart
waves should extend into shadow area (more) any 2 B2 [2]

(b) diagram showing large flat piece M1
with circular edges (ignore any wavelength changes) but straight part must be (very) nearly equal to slit width A1 [2]

(c) speed = 1.2 x 8 C1
= 9.6 cm/s A1 [2]

[Total: 6]

8 **(a)** switch in correct position B1 [1]

(b) **(i)** rheostat/variable resistance symbol drawn B1

(ii) dot and R in line to 12 W lamp B1 [2]

(c) Question deleted

(d) R = V/I or 12/.3 C1
= 4Ω A1 [2]

(e) **(i)** parallel circuit/all lamps connected separately across the 12V B1

(ii) 4 A A1 [2]

[Total: 7]

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 –	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 waves, (equal about centre line)	B1	[1]
					[Total: 8]
10	**(a)**		A – resistor B – LDR C – transistor D – lamp (–1 each incorrect)	B2	[2]
	(b)		C	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 V) switches lamp on	B1 B1 B1	[3]
					[Total: 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 pairs/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 method other examples will occur, must have two clear points: e.g. 1. gamma rays aimed at cancer (not just radiation) focused on tumour e.g. 2. fission of heavy nucleus (accept named nuclide) leads to more fissions/chain reaction	B1 B1	[4]
					[Total: 7]