

MARK SCHEME for the October/November 2006 question paper

5054 PHYSICS

5054/02

Paper 2 (Theory), maximum raw mark 75

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.



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	GCE O LEVEL - OCT/NOV 2006	5054	2

Max. 1 unit penalty per question, no excess sig. fig. penalty unless stated.

Section A

1 (a) (i)	12 m/s	B1
(ii)	16 s	B1
(iii)	192 m or (i) × (ii)	B1
(b)	a = (v-u)/t in any format e.g. numerical (allow 4 clearly attributable wrong numbers) or gradient of v-t/the graph 2.7 (2/3 sig. fig. only, do not accept fraction, cao) m/s ²	C1 A1 B1 6
2 (a)	9.8 or 10 or 9.83 to 9.79. (m/s ²), ignore wrong unit	B1
(b) (i)	air resistance balances/equals/is same as weight (accept gravity) no resultant force or upwards force = downwards force	
(ii)	weight larger than air resistance (accept gravity) resultant force (down) or downwards force greater or upwards force less	ANY 3 B3
(c)	coin and/or paper fall faster or hit base sooner coin and/or paper accelerate at g coin falls with paper or at same rate or same av. speed or same acceleration or hit bottom together or at same time (NOT fall at same speed/same time)	ANY 2 lines B2 6
3 (a)	time or observe when wax melts/falls or states first to melt/fall first to do so or less wax left (after given time) (transfers heat best)	B1 B1
(b)	black or black cools quickly better emitter (of heat) A1 OR better radiator/black radiates white doesn't radiation/infra-red A1 of heat/infra-red Accept in terms of white teapot (NOT better emitter and absorber/conductor)	M1 A1 A1 5
4 (a) (i)	reflected ray correct by eye and normal	B1
(ii)	40 °	B1
	40 ° or same as angle of incidence	B1
(b)	diagram with object, mirror, image in approx. correct position at least 1 ray drawn from object/ray-box correctly reflecting from mirror at least 2 rays extrapolated back to image position	B1 B1 B1
OR(b)	diagram with object, mirror, image in approx. correct position OR Use of search pin behind mirror shown/stated no parallax used to locate image or described (ignore arrows/do not insist on dotted lines)	B1 B1 B1 6
5 (a)	each horizontal towards S – allow gentle curve only on upper compass	B2
(b)	N-S N-S B1 OR S-N S-N	B2
(c)	diagram showing nail/coil or hammer/nail or appropriate heater/nail or nail/floor a.c supply and remove/turndown slowly or repeatedly hammer or heat red-hot or drop repeatedly (second mark consistent with first)	B1 B1 6

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6 (a)	P.E. (of water) to K.E. (of wheel or water)/K.E. (of wheel) to electrical energy/ KE of water to KE of wheel /PE to electrical energy ANY 2 (-1 each clearly wrong answer beyond 2)	B2
(b)	1200/2000 or energy output/ energy input or power output/power input (NOT output/input) 0.60 or 60% (NOT fractions; 0.6 YES)	C1 A1
(c)	friction in wheel or generator (bearings/axle) or water out has K.E. or produces heat in windings/in resistance or heat (in bearings) due to friction (ignore sound) ANY 2 (-1 each clearly wrong answer beyond 2)	B2 6
7 (a)	electromagnetic/em induction or induced current/e.m.f. (NOT magnetic/electric induction)	B1
(b)	deflects to left/opposite deflection	B1
(c)	nothing or no deflection/current/e.m.f. or needle stationary no lines of flux are cut or no change in magnetic field	B1 B1 4
8 (a)	0 (V)	B1
(b) (i)	8 Ω (i.e. accept 1 sig.fig.)	B1
(ii)	R = V/I any algebraic form in (ii) or (iii) 2 A (i.e. accept 1 sig.fig.) ecf (i)	B1 B1
(iii)	16/8 in (ii) or (ii) \times 6 12 V ecf (ii)	C1 A1 6

Section B

9 (a)	set wood swinging/let metal pivot or fall OR balance on sort of edge allow to come to rest clearly a sharp edge use of plumb line from hole mark line of edge mark line along plumb line (on metal) repeat in new position hang from another hole intersection is centre of mass line intersection is centre of mass repeat for 3 rd position hang from 3 rd hole	OR balance on point sharp (compass) point move till balanced point is centre of mass
(b) (i)	ANY 6 consistent lines max. force \times distance perpendicular (accept symbol) distance or shortest distance to line of action of force	B6 M1 A1
(ii)	correct perpendicular distance (2.9 – 3.1 cm) worked out value of: 0.1 \times distance reading Ncm (or Nm if conversion of distance to m clear)	B1 B1 B1
(c) (i)	moment or turning effect of weight anticlockwise and clockwise moment or weight to right and left of corner	C1 A1
(ii)	moments balance/cancel or weight inside base	B1
(iii)	thicker more stable/thinner less stable	B1 15

Page 4	Mark Scheme	Syllabus	Paper
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10 (a)	yellow/green to earth blue to neutral and brown to live tighten terminal screws cable (outer cover) under grip no bare metal on wires earth wire longest put cover back on	ANY 4 (-1 each clearly wrong answer beyond 4)	B4
(b) (i)	earth		B1
(ii)	plastic/lamp/cover/base made from insulator/does not conduct electricity doubly insulated or plastic/lamp/cover/base cannot be live or cannot electrocute/shock		B1 B1
(iii)	100 J (100 J/s first mark only) (electrical)(energy) used/transformed/converted/delivered/arrives per second		B1 B1
(iv)	$P = VI$ (in any form numerical or algebraic) 0.43(48) (accept 1 sig.fig.) Fuse: 0.5/1.0/2.0/3.0 A		B1 C1 A1 B1
(v)	VIt or Pt (in any form numerical or algebraic) 30×60 or 1800 (s) seen 180 000 J (3000 J 2/3; 0.05 kWh 3/3)		C1 C1 A1 15
11 (a) (i)	$d = \text{speed} \times \text{time}$ in any format 600/300 000 or 600 000/300 000 000 0.002 s		C1 C1 A1
(ii)	similarities: same speed (in vacuum) travel in a vacuum travel in straight lines refract/reflect/diffract/interfere carry energy transverse/polarisable	ANY 2 (-1 each clearly wrong answer beyond 2) (NOT both obey $c = f\lambda$ /waves/invisible/undeflected by magnetic/electric field)	B2
	differences: wavelength frequency microwave received by aerials	ANY 1 line (wavelength of IR different YES; wavelength of IR longer NO)	B1
(b) (i)	gravity		B1
b	potential energy to kinetic energy kinetic energy to heat/thermal energy OR potential energy to heat/thermal energy -1 each clearly wrong answer beyond 2		B1 B1 OR B2
(iii)	nuclei repel or nuclei are positive nuclei need high speed/ K.E. (so high temperature)		B1 B1
(iv)	1 proton or proton number = 1 2 neutrons or neutron number = 2 (electron(s) max 1)		B1 B1
(v)	He or helium		B1
(vi)	energy/heat produced or raises temperature or becomes hot or causes star to expand or counters gravitational collapse or loses mass		B1 15