

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

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.



Page 2	Mark Scheme	Syllabus	Paper
	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) $\times$ (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 C1
2.7 (2/3 sig. fig. only, do not accept fraction, **cao**) A1
m/s² B1 6
- 2 (a) 9.8 **or** 10 **or** 9.83 to 9.79. (m/s²), 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
(b) black **or** black cools quickly M1
better emitter (of heat) A1 **OR** better radiator/black radiates white doesn't A1
radiation/infra-red A1 of heat/infra-red A1 5
Accept in terms of white teapot (NOT better emitter and absorber/conductor)
- 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 B1
at least 1 ray drawn from object/ray-box correctly reflecting from mirror B1
at least 2 rays extrapolated back to image position B1
OR(b) **diagram** with object, mirror, image in approx. correct position
OR B1
Use of search pin behind mirror shown/stated B1
no parallax used to locate image **or** described B1 6
(ignore arrows/do not insist on dotted lines)
- 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 B1
a.c supply **and** remove/turndown slowly **or** repeatedly hammer **or** heat red-hot **or** drop repeatedly (second mark consistent with first) B1 6

Page 3	Mark Scheme	Syllabus	Paper
	GCE O LEVEL - OCT/NOV 2006	5054	2

- 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) C1
0.60 **or** 60% (NOT fractions; 0.6 YES) 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 B1
no lines of flux are cut **or** no change in magnetic field B1 4
- 8 (a) 0 (V) B1
- (b) (i) $8\ \Omega$ (i.e. accept 1 sig.fig.) B1
(ii) $R = V/I$ any algebraic form in (ii) or (iii) B1
2 A (i.e. accept 1 sig.fig.) ecf (i) B1
(iii) $16/8$ in (ii) **or** (ii) $\times 6$ C1
12 V ecf (ii) 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 3rd position
hang from 3rd hole
- OR** balance on point
sharp (compass) point
move till balanced
point is centre of mass
- (b) (i) ANY 6 consistent lines max. B6
force $\times$ distance M1
perpendicular (accept symbol) distance **or** shortest distance to line of
action of force A1
- (ii) correct perpendicular distance (2.9 – 3.1 cm) B1
worked out value of: $0.1 \times$ distance reading B1
Ncm (or Nm if conversion of distance to m clear) B1
- (c) (i) moment **or** turning effect of weight C1
anticlockwise and clockwise moment **or** weight to right **and** left of
corner 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
	GCE O LEVEL - OCT/NOV 2006	5054	2

- 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 B1
doubly insulated **or** plastic/lamp/cover/base cannot be live **or** cannot electrocute/shock B1
(iii) 100 J (100 J/s first mark only) B1
(electrical)(energy) used/transformed/converted/delivered/arrives **per second** B1
(iv) $P = VI$ (in any form numerical or algebraic) C1
0.43(48) (accept 1 sig.fig.) A1
Fuse: 0.5/1.0/2.0/3.0 A B1
(v) VIt **or** Pt (in any form numerical or algebraic) C1
 30×60 **or** 1800 (s) seen C1
180 000 J (3000 J 2/3; 0.05 kWh 3/3) A1 15
- 11 (a)** **(i)** $d = \text{speed} \times \text{time}$ in any format C1
600/300 000 **or** 600 000/300 000 000 C1
0.002 s 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) B2
(NOT both obey $c = f\lambda$ /waves/invisible/undeflected by magnetic/electric field)
differences:
wavelength
frequency
microwave received by aerials ANY 1 line B1
(wavelength of IR different YES; wavelength of IR longer NO)
- (b)** **(i)** gravity B1
b potential energy to kinetic energy B1
kinetic energy to heat/thermal energy B1
OR potential energy to heat/thermal energy **OR** B2
-1 each clearly wrong answer beyond 2
(iii) nuclei repel **or** nuclei are positive B1
nuclei need high speed/ K.E. (so high temperature) B1
(iv) 1 proton **or** proton number = 1 B1
2 neutrons **or** neutron number = 2 (electron(s) **max 1**) 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