CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0625 PHYSICS

0625/21 Paper 2 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, 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, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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NOTES ABOUT MARK SCHEME SYMBOLS & OTHER MATTERS

B marks   are independent marks, which do not depend on any other marks. For a B mark to be scored, the point to which it refers must actually be seen in the candidate's answer.

M marks   are method marks upon which accuracy marks (A marks) later depend. For an M mark to be scored, the point to which it refers **must** be seen in a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored.

C marks   are compensatory method marks which can be scored even if the points to which they refer are not written down by the candidate, provided subsequent working gives evidence that they must have known it. e.g. if an equation carries a C mark and the candidate does not write down the actual equation but does correct working which shows he knew the equation, then the C mark is scored.

A marks   are accuracy or answer marks which either depend on an M mark, or which are one of the ways which allow a C mark to be scored.

c.a.o.   means "correct answer only".

e.c.f.   means "error carried forward". This indicates that if a candidate has made an earlier mistake and has carried his incorrect value forward to subsequent stages of working, he may be given marks indicated by e.c.f. provided his subsequent working is correct, bearing in mind his earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated "e.c.f."

e.e.o.o.   means "each error or omission".

brackets ( )   around words or units in the mark scheme are intended to indicate wording used to clarify the mark scheme, but the marks do not depend on seeing the words or units in brackets, e.g. 10 (J) means that the mark is scored for 10, regardless of the unit given.

underlining   indicates that this <u>must</u> be seen in the answer offered, or something very similar.

OR/or   indicates alternative answers, any one of which is satisfactory for scoring the marks.

o.w.t.t.e.   means "or words to that effect".

Spelling   Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit.

Significant figures
     Answers are acceptable to any number of significant figures $\geqslant 2$, except if specified otherwise, or if only 1 significant figure is appropriate.

Units   Incorrect units are not penalised, except where specified. More commonly, marks are allocated for specific units.

Fractions   These are only acceptable where specified.

Extras   Ignore extras in answers if they are irrelevant; if they contradict an otherwise correct response or are forbidden by mark scheme, use right + wrong = 0

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Ignore   Indicates that something which is not correct is disregarded and does not cause a right plus wrong penalty.

Not/NOT   Indicates that an incorrect answer is not to be disregarded, but cancels another otherwise correct alternative offered by the candidate i.e. right plus wrong penalty applies.

Work which has been crossed out, but not replaced, should be marked as if it had not been crossed out.

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1 (a) moment/torque
ignore turning force   B1

(b) opposite direction   B1
condone different direction(s)
larger or correct reverse argument (opening force is smaller)   B1

(c) (apply) force further from hinge
OR oil/reduce friction/new hinge/use an assist mechanism/replace hinge(s)   B1   [4]

2 (a) D = M / V in any form   B1

(b) (i) length × width × height in any form
OR 2.5 (× 10^4) × 6.0 (× 10^3) × 3 (× 10^{-6}) i.e. ignore powers of 10   C1
$4.5 × 10^n$ any power of 10   C1
450 (m^3) c.a.o. $4.5 × 10^2$ A1

(ii) 900 × his 450 or correct sub into D = M / V   C1
$4.05 × 10^5$ OR 405 000 (kg) e.c.f.   A1   [6]

3 (a) speed = distance / time in any form OR distance / speed   C1
80 / 320   C1
0.25 (s)   A1

(b) (i) 0.45 OR his (a) + 0.2(0) correctly evaluated   B2
(allow B1 only, 0.05 / his(a) – 0.2(0) OR 0.25 / his (a) alone)

(ii) start timing when he sees flash/smoke (accept any other
appropriate visual stimulus e.g. hand dropping as gun fires)   B1

(c) 12.5 ± 0.2(s) Condone (1 min) 12.5 s OR 12.05 / 12.5 – 0.45   C1

12.95 OR 12.5 + his **(b)(i)**   A1   [8]

Page 5	Mark Scheme	Syllabus	Paper
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4 (a) top box ticked   B1

(b) elastic/strain/potential NOT gravitational PE   B1

(c) kinetic   B1
ignore heat

(d) gravitational/gravitational potential/GPE/PE   B1
maximum   B1
kinetic OR thermal/allow heat   B1
thermal allow heat   B1   [7]

5 (a) (i) move/vibrate/oscillate faster OR increase/gain KE   B1
move (further) apart OR (they) separate   B1

(ii) any 1 increases/enlarges/gets bigger/expands o.w.t.t.e.   C1
<u>all</u> three increase   A1

(b) nut/hole expands/enlarges
ignore particles expand/enlarge   B1
bolt doesn't expand (as much)   B1   [6]

6 (a) (i) r correctly shown   B1

(ii) bent up at first surface   B1
bent up at second surface   B1
straight line within prism   B1

(iii) P clearly shown as the original point of entry   B1

(b) (i) blue light refracted from same point at first surface   B1
blue shown with greater refraction   B1
blue light always below red light   B1

(ii) dispersion   B1   [9]

Page 6	Mark Scheme	Syllabus	Paper
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7 (a) arrow pointing to left   B1

(b) rotates/turns/S pole goes away from magnet/repelled/ changes direction   B1
N pole points to magnet/S Pole points to N Pole (of Earth)/turns through 180°   B1
S Pole/N Pole points in opposite direction

(c) magnetic field/electromagnet(ism)/(ic)   M1
caused by current   A1   [5]

8 (a) its voltage/potential difference   C1
condone volts
its e.m.f./electromotive force   A1

(b) $V = IR$ in any form OR V / R C1
$4.5 / 180$ C1
0.025 OR 2.5×10^{-2} OR $1 / 40$ A1
A/amps/amp/a   B1

(c) (i) two resistors shown in parallel (accept any symbol here)   B1
condone faint lines through resistors (where attempted to rub out wire)

battery in series with resistances (allow any recognisable symbol here)   B1
(even if resistances not in parallel)
all symbols correct (allow cell symbol for battery)   B1
(allow rheostat for resistor condone old symbol)

(ii) 1. 4.5 (V)   B1
ignore units
2. 0.025 OR his (b)   B1
ignore units   [11]

9 (a) switch correctly identified   B1

(b) (i) moves/flows condone (current) flows   OR   stays the same   B1
ignore nothing (happens)

(ii) increases/higher/greater   M1
condone greater than zero
any indication of gradual increase   A1

(c) remains the same OR decreases/goes back to zero (very) <u>slowly</u> i.e. ignore   B1   [5]
decreases/getting smaller on their own.

Page 7	Mark Scheme	Syllabus	Paper
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10 (a) copper   B1

(b) core   B1

(c) $N_p / N_s = V_p / V_s$ in any form   C1
8000/N_s = 240 / 6 OR $\underline{240} = \underline{6}$ OR $\underline{N_s} = \underline{6}$ C1
8000 N_s 8000 240
200   A1

(d) (i) lamp less bright/less than full brightness/wouldn't light   B1
(up properly)/ has less energy

(ii) lamp blows/bursts OR lamp too bright OR lamp   B1   [7]
overheats/burns out OR much brighter/has more energy

11 (a) paper stops α   C1
sheet of paper makes no difference to count rate   A1

(b) Aluminium absorbs β allow aluminium stops β   C1
Aluminium makes count rate decrease   A1

(c) (10mm) lead / Pb stops all β OR only γ gets through (10 mm) lead / Pb   B1
still some count rate with lead / Pb   B1   [6]

12 (a) (i) (number of) protons + neutrons OR p + n   B1
OR mass number/nucleon number

(ii) (number of) proto<u>ns</u> OR atomic number/ proton number   B1
Ignore electrons

(b) (i) zero nucleons OR mass number is zero   B1

(ii) negative charge OR requires a proton to be neutral   B1

(c) (i) $^{240}_{94}$Pu OR Pu OR $^{240}_{94}$ B1

(ii) $^{250}_{98}$Cf OR $^{250}_{98}$ NOT just Cf   B1   [6]

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