UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2007 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 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.

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.

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

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NOTES ABOUT MARK SCHEME SYMBOLS

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 must be seen in the answer offered, or something very similar.

un.pen.   means "unit penalty". An otherwise correct answer will have one mark deducted if the unit is wrong or missing. This **only** applies where specifically stated in the mark scheme. Elsewhere, incorrect or missing units are condoned.

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

1 **(a)** **(i)** 1.6s to 1.8s ALLOW 4.2 – 6s ALLOW 4.4 – 6s NOT 2s NOT 4.0 – 6s   B1

(ii) 6 – his **(i)**, evaluated ALLOW 0 – 4.2s ALLOW 0 – 4.4s NOT 0 – 4s e.c.f.   B1

(iii) his **(i)** × 20   C1
32 – 36m or his **(i)** × 20 evaluated
allow B1 only for 40m with no working   A1

(iv) area under whole graph or ½vt + his**(iii)**   C1
70 – 95m   A1

(b) **(i)** weight of ball down and (air) resistance up
OR friction opposes weight   )
upward/resistance/friction force increases
with time/distance/speed/as ball falls   ) any 3   B1×3
net force reduces   )
less force, so less acceleration   )

(ii) up force = down force OR no resultant force OR air res. = weight   B1
no net force, no acceleration/constant speed   B1

[Total: 11]

2 **(a)** **(i)** down to R and up towards Q/S, then reverse OR equivalent
OR back towards Q, then reverse   B1
continues backward and forward until stops (at R)   B1

(ii) idea of energy loss OR because of friction NOT PE/KE   B1

(b) (PE lost =) 1.2 × 0.5 OR 0.6 (J) OR 0.12 × 10 × 0.5 OR mgh OR wt × dist   C1
i.e. evidence of mgh

$0.5 × 0.12 × v^2$ = mgh OR 0.6 etc. e.c.f.   C1
i.e. evidence of ½mv^2

3.16 OR 3.2 m/s c.a.o.   A1

[Total: 6]

3 (a) any logical method e.g.
extension is 2 cm for 8 N or 1 cm for 4 N   C1
final extension is 3 cm   C1
need 12 N to extend to 6 cm   A1

(b) (i) shown on diagram:
distance from pivot to F OR value of weights OR dist from weights to pivot   B1

(ii) force/weight of load × distance from pivot to force
(accept symbols if clear)   B1

[Total: 5]

4 (a) (i) random   B1
high speed (between collisions)   B1

(ii) hit walls   B1
many hits/unit area OR hit hard OR large force OR high energy
OR many hits/s OR hit very often   B1

(b) particles vibrate (more) OR electrons gain energy   B1
particle to particle transfer OR flow of free electrons   B1

(c) 75 × 3200 OR ml   C1
240 000 J OR 240 kJ OR 2.4×10^5 J   A1

[Total: 8]

5 (a) take readings of the detectors   B1
fill box with water   B1
take readings (again)   B1

(b) dull black best AND shiny white worst   B1

(c) two different metals   B1
two junctions (could be at meter) hot and cold need not be indicated   B1
any cell, max B1,B0

[Total: 6]

6 **(a)** mirror: 2 reflected rays approx correct   M1
projected back to approx correct labelled image   A1
note: images may be dots or lines

        lens: ray through F, correct by eye   M1
ray <u>through</u> centre OR ray through other F, correct by eye   M1
projected back to approx correct (labelled) image   A1

  (b) **(i)** not produced by real rays crossing
OR cannot be caught on a screen
OR rays appear to come from image   B1

     (ii) upright/right way up/erect c.a.o.   B1

   (iii) lens image enlarged AND mirror image same size c.a.o.
OR (different) size OR (different) distance OR different side   B1

[Total: 8]

7 **(a)** **(i)** diagram showing compressions and rarefactions
(could be either spaced vertical lines or dots, or coil or sine wave)   B1
2C's and 2R's in approx correct place   B1

     (ii) wavelength correctly marked, by eye   B1

  (b) **(i)** all 3 in correct positions   B1

     (ii) radio (waves)   B1

   (iii) 3×10^8 m/s   B1

[Total: 6]

8 (a) circuit 1 series AND circuit 2 parallel B1

(b) switch off each one separately)
one fails, other works)
both get full current/voltage/same voltage) any 2 B1+B1
other good point e.g. more heat in parallel)
lower resistance)

(c) (total R =) 10 (Ω) C1
(V =) 12V A1

(d) 1/R = 1/4 + 1/6 (= 5/12) OR 1/R = 1/R_1 + 1/R_2 C1
2.4 (Ω) A1

(e) (i) 3(A) B1

(ii) 24W B1

(iii) 7200J e.c.f. **(ii)** B1

[Total: 10]

9 (a) when magnetic field cuts/cut by conductor/wire/coil/solenoid
OR change in magnetic field linked with coil etc. B1

current/e.m.f caused B1

(b) solenoid ends connected to meter/lamp note: any sign of a cell gets B0 B1
magnet indicated in suitable position on axis of solenoid B1

(c) insert/withdraw/move magnet into/out of solenoid B1
meter gives reading (as magnet moves) OR watch the meter OR lamp glows B1

(d) move magnet faster)
increase strength of magnet) any 2 B1+B1
more turns on solenoid)
closer to solenoid)

[Total: 8]

10 (a) (i) low/0/off/no output   B1

    (ii) low/0/off/no output   B1

  (b) (i) temp sensor to NOT gate input, correct symbol   B1
output of NOT gate (condone incorrect symbol) and humidity
sensor to AND inputs (condone labelled box for AND gate)   B1

    (ii) NOT low in, high out   B1
AND both inputs high, high output   B1
Note: B0, B0 for states on wrong diagram.

[Total: 6]

11 (a) detector, no source, no aluminium, take count OR take background   B1
no aluminium, take count   B1
aluminium, take count   B1
subtract background/reading 1 from results   B1

  (b) count decreases as thickness of aluminium increases   B1
6-10 sheets/several sheets/few mm,
count reduced to background count/β-particles stopped   B1

[Total: 6]