UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0625 PHYSICS

0625/23   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 must be read in conjunction with the question papers and the report on the examination.

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NOTES ABOUT MARK SCHEME

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.

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

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 > 2, except if specified otherwise, or if only 1 sig. fig. 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

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.

1 **(a)** **(i)** BC   OR   40 – 70   OR   2nd section   B1

       (ii) AB   OR   0 – 40   OR   1st section   B1

   (b) **(i)** area under graph OR speed × time seen or used   C1
         70–40   OR   30   C1
         8 × 30   e.c.f.   C1
         240 (m)   A1

       (ii) 7 × 10   OR   average speed × time
         OR area of triangle + area of rectangle   C1
         70 (m)   A1

   (c) line down from D to axis at 110s (need not be straight)   B1
                                                                    [Total: 9]

2 **(a)** 76 (cm Hg)   B1

   (b) 60 – 50   C1
         candidate's **(a)** + or – 10 e.c.f.   C1
         86 (cm Hg)   c.a.o.   A1

   (c) L.H. goes up   B1
         R.H. goes down   B1
                                                                 [Total: 6]

3 **(a)** diagonal, top L to bottom R, drawn (accept any part of this diagonal)   B1

   (b) within range 23 – 27 (°)   B1

   (c) candidate's **(b)**   B1

   (d) larger angle before toppling   B1
                                                                 [Total: 4]

4 **(a)** **(i)** gravitational/potential/GPE/PE   B1
       (ii) force/mass/weight   AND   height/distance   C1
         force/mass/weight <u>of (basket) of rocks</u> AND height/distance <u>of cliff</u>   A1

   (b) chemical/chemical PE   NOT just PE   B1

   (c) time   M1
         to raise basket up cliff   A1
                                                                 [Total: 6]

5 **(a)** clear cross/dot at centre of waves   B1

(b) wave approximating to a "sine" wave   M1
equal spacing, by eye
amplitude greater at one end/centre than other   } any 1   A1
waves above and below equilibrium line

(c) **(i)** constant (in any direction)   B1
same in all directions   B1

(ii) concentric circle   M1
same spacing as others, by eye (allow free-hand drawing)   A1
[Total: 7]

6 **(a)** 0 and 100   B1

(b) **(i)** expands   B1

(ii) moves along the tube/up/to the right   B1
stops at/near 100 mark/100°C/100/temp of boiling water   B1

(c) arrow pointing to somewhere between RH end of bulb & –10 mark   B1
[Total: 5]

7 **(a)** any large surface, stated or example e.g. wall/cliff/mountain   B1

(b) **(i)** when hears bang/sees flash   B1

(ii) when hears echo   B1

(c) **(i)** use of 2.25 (s)   C1
speed = distance/time in any form OR 2×distance/time   C1
720/2.25 OR 360/2.25
allow e.c.f. from time, if working shown   C1
320 (m/s) c.a.o.   A1

(ii) distance from firework
reaction time, however expressed   } any 1   B1
stretching tape
wind

[Total: 8]

8 **(a)** molecules/atoms/particles oscillating/vibrating   B1
       bigger vibrations/amplitude/spacing when heated   B1

     (b) **(i)** appropriate situation + problem
             e.g. telegraph wires + contract in cold weather   M1
             description of solution   e.g. allowed to sag between poles   A1

          (ii) appropriate example   e.g. fitting metal tyres   M1
               description of procedure   e.g. heat tyres before fitting   A1

                                                                 [Total: 6]

9 **(a)** moves/deflects   M1
       momentary (or equivalent)   OR   goes back to zero/centre   A1

     (b) moves/deflects in other direction   B1

     (c) e.m.f./electromagnetic force/current/voltage/p.d.   B1
        induced   B1
        (allow B1 for magnetic field is changed)

                                                                [Total: 5]

10 **(a)** line with negative slope throughout   B1
        negative intercept on I axis   B1

     (b) $R = V/I$ in any form   C1
        2/5   C1
        0.4 (A)   A1

     (c) **(i)** 20 (Ω)   B1

          (ii) 0.1 (A)   B1

     (d) idea of current halved, so resistance doubled   C1
        5   OR   5.0 (Ω)   A1

     (e) heating and magnetism ticked –1 e.e.o.o.   B2
                                                                [Total: 11]

11 (a) diagram:
source, solid absorber, detector shown in line — B1

method:
distance between source & detector small/<5cm — B1
take reading with no absorber — B1
insert sheet of paper/aluminium (ignore thickness) — B1
take reading with absorber present — B1

identification:
if no/background reading with paper absorber, then α
OR if still get a reading, then β

B1

(NOTE no mark for identification based on Al absorber)

(b) in range 15–20 (mins) — B1

[Total: 7]

12 (a) (i) nucleus — B1

(ii) electron(s) — B1

(b) (i) proton(s) — B1

(ii) 2 — B1

(iii) 4 at top — B1
2 at bottom — B1

[Total: 6]