UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

0625 PHYSICS

0625/22   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.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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 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   Answers are acceptable to any number of significant figures ≥ 2, except if figures 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 cancel otherwise correct alternative offered by the candidate i.e. right plus wrong applies.

1 **(a)** D = M/V   in any form, letters, words, numbers

394 – 210   OR   184   C

0.92   A1

g/cm^3 B1

(accept correct conversion to kg/m^3, with unit)

(b) decreases   B1   [5]

2 **(a)** sound/waves hitting obstacle   C1

reflected/bounced back (from obstacle)   A1

(b) **(i)** speed = distance/time   in any form   C1

12.9/1500   C1

0.0086   OR   8.6 × 10^{-3} (s)   A1

(ii) 130 – 150 (m)   B1   [6]

3 **(a)** turning effect   OR   force x distance (from fulcrum)   B1

(b) **(i)** A <u>and</u> idea of bigger distance <u>from hinge/pivot</u>   B1

(ii) closes   B1   [3]

4 **(a)** temperature at which   B1

change between solid and liquid (or v.v.)   B1

(b) stays constant   (if **(b)** left blank, can score from **(a)**, if stated there)   B1

(c) one section horizontal   M1

at −10°C   A1

curve, decreasing gradient, down to L end of horiz section from 50 at t = 0   A1

curve from R end of horiz section to −18, but no lower   A1   [7]

5 **(a)** **(i)** decreases   B1

(ii) thermistor   B1

(b) **(i)** **1.** put X in ice   M1

pure   OR   melting   A1

2. put X in steam/boiling water   M1

pure   OR   standard pressure   A1

record ammeter reading mentioned somewhere in **(b)(i)**   B1

(ii) idea of not very accurate/ not linear   M1

unless more calibration points (between 0°C and 100°C)/other logic   A1   [9]

6 **(a)** **(i)** **1.** points P & P joined and continued back to lens surface ⎫ both
points Q & Q joined and continued back to lens surface ⎭

        2. single straight line across lens for each ray, joining incident and
emerging rays   B1

    (ii) F clearly shown at junction of the 2 refracted rays   B1

  (b) **(i)** **1.** refraction   B1
        2. reflection   M1
        total OR internal   A1

    (ii) refracted away from normal   M1
same angle as ray striking 1st surface of block (by eye)   A1   [8]

7 **(a)** increases   B1

  (b) **(i)** R side   M1
link shown between speed & distance between waves/wavelength
(accept $v = f\lambda$)   A1
R side has bigger distance, so faster, so deeper (all 3 steps)   A1
(accept reverse logic for L side)

    (ii) **1.** waves further apart   B1
        2. waves further apart   B1   [6]

8 **(a)** **(i)** attract   B1

    (ii) repel   B1

    (iii) repel   B1

  (b) water charged   B1
opposite charge OR positive charge OR by induction   B1
<u>charge</u> on water attracted by <u>charge</u> on rod   B1   [6]

9 **(a)** **(i)** **1.** magnetised   B1
        2. attracted OR magnetised   B1
        3. deflects   M1
        momentary OR then goes back to zero   A1

    (ii) deflects other way   B1

  (b) **(i)** electromagnet shown as coil wrapped around iron bar
(interpret generously, but B0 if wire clearly connected to iron bar)   B1
series circuit containing electromagnet, battery/cell, and variable resistance
(condone inaccuracy of symbols, if clear)   B1

(ii) zero/minimum/resistance

10 (a) (i) voltmeter NOT voltameter   B1

(ii) voltmeter connected in parallel across R   B1
symbol correct   B1

(b) (i) 2 (A)   B1

(ii) 2 (A)   B1

(c) (i) R = V/I in any form   C1
8/2   C1
4 (Ω)   A1

(ii) candidate's (c)(i) + 4 correctly evaluated   B1

(d) 8 (V)   B1 [10]

11 (a) contaminated surfaces (any sort)
other radioactive material nearby
(radiation from) rocks/soil   } any 1   B1
cosmic rays/radiation from space
radon gas from ground

(b) alpha OR α   B1
beta OR β   B1
(−1 if gamma mentioned)

(c) any value within range 45–55   B1

(d) (i) (all) larger   B1

(ii) same   B1

(e) any sensible precaution   B1 [7]

12 (a) correct form of equation
i.e. $^{238}_{92}$U → ^A_ZTh + $^4_2$He   B1
A clearly 234   B1
Z clearly 90   B1

(b) mass number OR nucleon number OR no. of nucleons OR no. of protons
+ neutrons   B1

(c) atomic number   OR   proton number   OR   no. of protons/positive charges
IGNORE   no. of electrons