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.

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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 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 cancels another otherwise correct alternative offered by the candidate i.e. right plus wrong penalty applies.

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1 **(a)** D = M/V in any form, letters, words, numbers C1
394 – 210 OR 184 C1
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]

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6 (a) (i) 1. points P & P joined and continued back to lens surface
points Q & Q joined and continued back to lens surface } both B1

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
charge on water attracted by charge 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 B1 [8]

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
cosmic rays/radiation from space
radon gas from ground
} any 1 B1

(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. $^{238}_{92}U \rightarrow {}^{A}_{Z}Th + {}^{4}_{2}He$ 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 B1 [5]