CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

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 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 May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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.

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) use of 2 min 57 s / 177 s <u>AND</u> 6 min 14 s / 374 s   C1

attempt at subtracting one time from another / 3 min 17 s   C1
197 s   A1

(ii) division by 50   C1
3.94(s) OR 3.9(s) OR 4(s) OR 4.0(s) e.c.f. **(a)(i)**   A1

(b) (i) 5.5 (cm^3)   B1

(ii) 0.11 (cm^3)   (5.5 ÷ 50)   B1

[Total: 7]

2 (a) mercury   B1

(b) vacuum/nothing/(mercury) vapour   B1

(c) 75 (cm) OR the middle one   B1

(d) 25 (cm) OR 5 (cm)   B1

(e) level falls   C1
ends level with that in reservoir   A1

[Total: 6]

3 (a) [top R] evaporation/boiling   B1
[bottom L] freezing/solidification   B1

(b) molecules move apart/become free to move, accept bonds broken   B1
move around (amongst each other)/no longer in fixed positions   B1
temperature remains constant   B1

(c) (i) freezing point/ice point   B1

(ii) 0(°C)   B1

[Total: 7]

4 **(a)** mention of electrons   C1
free electrons/charge or equiv.   A1
idea of very many (free) charges in metals/conductors   B1
idea of very few/no (free) charges in plastic/insulators   B1
(note: "more (free) charges in metal than plastic" gets B1,B1)

    (b) rod charged, condone (gains)static charge/electricity   B1
charges attract (light objects)   B1
(note: "charges on the rod attract (hair)" gets B1, B1)

                                                               [Total: 6]

5 **(a)** lamp, accept bulb   B1

    (b) **(i)** $V = IR$ in any form   OR V/R C1
5 + 3   C1
4/8   C1
0.5   A1
A or amp(s) or ampere(s)   B1

        (ii) **1.** candidate's **(b)(i)**
                             } both, condone no/incorrect unit   B1
            2. candidate's **(b)(i)**

    (c) **(i)** voltmeter correctly shown across resistor   B1
correct voltmeter symbol   B1

        (ii) candidate's current $\times$ 3, correctly evaluated ($0.5 \times 3 = 1.5$ (V))   B1

                                                               [Total: 10]

6 **(a)** stroke with magnet   one direction
put in coil   current in coil } any 1 line   M1, A1
position N-S/next to magnet   hammer/heat

    (b) attractive   B1

    (c) N/n at left end <u>and</u> S/s at right end   B1

    (d) no force   B1

                                                               [Total: 5]

7 transverse } both   B1
longitudinal

longitudinal   B1
transverse   B1

[Total: 3]

8 **(a)** **(i)** top 2 boxes ticked –1 e.e.o.o.   B2

(ii) sound cannot travel through a vacuum
OR   sound needs a medium   B1

(b) **(i)** one sound direct   B1
one sound reflected/echoed accept bounces off   M1
from cliff/ZY, accept ground   A1

(ii) distance = speed $\times$ time   in any form   OR   distance/time   C1
195/0.6   C1
325 (m/s)   A1

[Total: 9]

9 **(a)** **(i)** **1.** $V_1/V_2 = N_1/N_2$ in any form   C1
correct substitution e.g. 120/ V_2 = 150/300   C1
240 (V)   A1

2. lamp lights   C1
full/normal brightness OR as designed, e.c.f. from **1.**   A1

(ii) lamp dim/does not light   B1
voltage low(ered)/stepped down   B1

(b) **(i)** to step up voltage/increase voltage
OR to save energy   OR   to reduce energy losses   B1

(ii) <u>step-down</u> transformer   OR   reduce voltage
OR   make voltage safe/mains voltage   B1

[Total: 9]

10 (a) $I = U + W$ accept correct re-arrangements   B1

(b) W OR wasted energy   B1

(c) (i) decrease   B1

    (ii) increase   B1

   (iii) decrease   B1

[Total: 5]

11 (a) 25 (counts / min) or something similar   B1
sensible explanation in terms of background   B1

(b) (i) smaller/lower/decreases accept stops   B1

    (ii) 1. all absorbed by foil or none reach detector or none penetrates foil   B1
        2. none absorbed by foil/ (rate) not altered/affected by thickness   B1

[Total: 5]

12 (a) (i) number of protons plus neutrons
accept "and" accept (total) number of particles in the nucleus   B1

    (ii) 238   B1

(b) (i) 1. 4   B1
      2. 2   B1

    (ii) 234 e.c.f. **(a)(ii)** and **(b)(i)**   B1
        90   e.c.f. **(b)(i)**   B1

(c) (i) 92   B1

    (ii) orbit(s) OR shell(s) OR outside nucleus
accept surround the nucleus   B1

[Total: 8]