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.

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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 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.

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1 **(a)** **(i)** use of 2 min 57 s / 177 s AND 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]

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

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

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

[Total: 10]

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

(b) attractive B1

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

(d) no force B1

[Total: 5]

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7 transverse } both
longitudinal } B1

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 × 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]

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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]

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