**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2012 series

## 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 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 October/November 2012 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.

o.w.t.t.e. means “or words to that effect”.

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 $\geqslant 2$, except if specified otherwise, or if only 1 significant figure 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

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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.

Work which has been crossed out, but not replaced, should be marked as if it had not been crossed out.

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| | | | |
|---|---|---|---|
| **1** | **(a)** **(i)** | 6 (km) | B1 |
| | **(ii)** | 8 minutes OR 8/60 | C1 |
| | | 0.13 (hours) OR 2/15 (hours) | A1 |
| | **(iii)** | Speed = distance/time in any form | C1 |
| | | distance/time correctly calculated and rounded | C1 |
| | | answer in range 45.0 – 46.2 (km/hr) NO e.c.f. | A1 |
| | **(b)** | straight line graph | B1 |
| | **(c)** **(i)** | 3 or 4 | B1 |
| | **(ii)** | 1 (km) | B1 |

[9]

| | | | |
|---|---|---|---|
| **2** | **(a)** | 8 or 8.0 (cm) | B1 |
| | **(b)** | $8 \times 4 \times 0.5$ e.c.f. from (a) | C1 |
| | | 16 ($cm^3$) e.c.f. | A1 |
| | **(c)** **(i)** | $D = M / V$ in any form OR $V \times D$ OR his volume $\times$ 1.2 | C1 |
| | | 19.2 (g) e.c.f. | A1 |
| | **(ii)** | balance (accept spring balance) OR scales NOT scale | B1 |

[6]

| | | | |
|---|---|---|---|
| **3** | **(a)** | less | B1 |
| | **(b)** | 123 (mm Hg) | B1 |
| | **(c)** | 752 + or – his 123 | C1 |
| | | 629 (mm Hg) c.a.o. | A1 |
| | **(d)** | same OR no change | B1 |

[5]

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**4** **(a)** X clearly beyond back of mirror B1
X correct vertical distance by eye B1

**(b)** **(i)** normal between mid point of mirror and P correct by eye B1

**(ii)** lines A′ and B′ drawn correctly to mirror so that i = r M1
either of top two boxes ticked A1
[5]

**5** **(a)** **(i)** 0 (J) B1

**(ii)** 150 (J) B1

**(b)** any timer B1
start timing at A or B OR fiducial aid B1
stop timing when gets back to start/after complete oscillation B1

stopwatch OR stopclock used B1
repeat and average OR time multiple swings B1
[7]

**6** **(a)** **(i)** convection B1

**(ii)** hot water expands/molecules further apart B1
NOT molecules expand
hot water less dense NOT molecules less dense B1
hot water rises, accept hot molecules rise B1
cool water falls/takes place of hot water B1

**(b)** hot air rises NOT heat rises B1
[6]

**7** **(a)** left box infra-red OR IR B1
right box gamma OR $\gamma$ B1

**(b)** **(i)** red B1

**(ii)** violet B1

**(c)** **(i)** infra-red OR IR B1

**(ii)** Any one from:
photographing/seeing (broken) bones
crystallography/crystal structure B1
any other sensible use

NOT body scan

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**(d)** Any one from:
same speed in a vacuum
all transverse (waves)
all transfer energy — B1

[7]

**8** **(a)** **(i)** meter 2 — B1

**(ii)** ammeter

**(b)** **(i)** meter 1 — B1

**(ii)** voltmeter

mark (a) and (b) together,
any 2 correct B1
remaining 2 correct B1

**(c)** **(i)** 1.6 (V) — B1

**(ii)** $R = V/I$ in any form OR $V/I$ — C1
1.6/ 0.8 OR e.c.f. from (c) (i)/0.8 — C1
2 or 2.0 — A1
ohm(s) OR Ω — B1

**(iii)** straight line through origin OR any $V/I$ gives same value — B1

**(iv)** greater slope OR bigger $V$ needed for same $I$ o.w.t.t.e. — B1

**(v)** wire B <u>AND</u> larger resistance from longer wires o.w.t.t.e. — B1

[10]

**9** **(a)** **(i)** L1 and L2 — B1

**(ii)** L2 and L3 — B1

**(b)**
L1 off
L2 full
L3 off
– 1 e.e.o.o. — B2

L1 partial
L2 partial
L3 partial
– 1 e.e.o.o. — B2

[6]

**10** **(a)** arrow down, close to or joined to wire — B1

**(b)** arrow up, close to or joined to wire — B1

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**(c)** **(i)** moves/bends up B1

**(ii)** motor/ammeter/voltmeter/galvanometer/multimeter B1

[4]

**11** **(a)** spontaneous/random break up OR unstable atoms B1
results in new element/particles OR nucleus changes B1
radioactive particles/α/β/γ emitted B1

**(b)** **(i)** clear statement of start point B1
clear halving B1
time to halve is 2 minutes B1

**(ii)** 550/2 OR 1100/4 OR 2200/8 C1
275 (counts/min) c.a.o. A1

[8]

**12** **(a)** vacuum B1

**(b)** glows or equivalent OR spot OR dot of light on screen B1
when electrons hit it B1

**(c)** heated B1

**(d)** cathode B1
anode B1

**(e)** $P_1$ and $P_2$ OR y-plates B1

[7]

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