CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0625 PHYSICS

0625/21 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)** 15 ±1 (cm^3) B1

(b) level shown at 40 ±1 cm^3 OR 25 + candidate's **(a)** ±1 cm^3 on magnified figure B1

(c) idea of goes up further OR more sensitive
OR idea of small variations causing larger height differences
OR larger divisions / more gradations B1

[Total: 3]

2 **(a)** **(i)** D = M / V in any form OR D × V C1
2300 × 0.0012 C1
2.76 OR 2.8 (kg) A1

(ii) (mass of bricks =) 500 × 2.76 OR 500 × candidate's **(a)(i)** C1
(total mass =) 1480 OR e.c.f. candidate's **(a)(i)** C1
yes / no ticked (expect yes), must be compatible with candidate's total mass A1

(b) **(i)** the same because made of same material B1

(ii) less than OR equivalent answer B1

[Total: 8]

3 **(a)** (frictional/tension/applied) force and newton/N B1
distance and metre/m, centimetre/cm or correct metric unit B1

(b) time / speed B1

(c) **(i)** smaller / less / drops B1

(ii) smaller / less / drops B1

(iii) smaller / less / drops B1

(d) chemical B1

[Total: 7]

4 **(a)** mercury/Hg OR alcohol OR named alcohol e.g. ethanol B1

(b) vacuum OR nothing OR empty OR vapour B1

(c) ice point indicated and labelled at 0 °C B1
steam point indicated and labelled at 100 °C B1

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(d) (i) moves to the right (or equivalent e.g. goes higher/up/rises) B1

(ii) liquid expands NOT thermometer/particles expands B1

[Total: 6]

5 (a) 4 (hours) OR 5 ½ / 5.5 (hours) / 5 hours 30 mins B1

(b) (i) 300 (km) B1

(ii) 30 (km) B1

(iii) 270 (km) e.c.f. **(i)** & **(ii)** B1

(c) 2 horizontal sections clearly indicated B1

(d) last section, however expressed e.g. after 6 hours B1
smallest slope OR smallest distance in ½ hour B1

(e) distance ÷ time C1
300 ÷ 6.5 C1
answer in range 46–46.2 A1
correct unit e.g. km / h B1

[Total: 11]

6 (a) same pressure B1

(b) 6 cm of oil greater B1

(c) (i) **1.** falls / decreases / down
2. rises / increases / up
} both needed B1

(ii) they move faster / more energetically o.w.t.t.e.
collisions more frequent/often or harder
collisions with walls/container/sides
larger force (on wall/container)
} any 3 points B1 × 3

[Total: 6]

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7 **(a)** refracting, converging B2

(b) dispersing, refracting B2

(c) violet accept blue/purple/mauve/indigo B1

(d) **(i)** infra-red / IR B1

(ii) idea of lamp hot/emitting heat OR glass passes IR B1

[Total: 7]

8 **(a)** **(i)** principal focus / focal point / focus / focus point B1

(ii) PF B1

(b) **(i)** rays from top of object
ray parallel to axis, to lens centre and through F
ray to P and then straight on
ray through other f.p. and then parallel
} any 2 B1 × 2

Z labelled at intersection of rays (even if rays wrong) B1

(ii) correct inverted image drawn (condone no labelling) between candidate's Z and the axis and perpendicular to axis A1
(if no label, must be very clear what is image)

[Total: 6]

9 **(a)** current B1

(b) **(i)** **1.** $R_1 + R_2$ OR 16 + 8 C1
24 (Ω) A1

2. $V = I R$ in any form OR V / R C1
12 / 24 e.c.f. **1.** C1
0.5 A1
A/amp/ampere(s) B1

(ii) **1.** 0 OR zero/nothing (ignore any unit) B1

2. 12 V B1

[Total: 9]

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10 **(a)** rheostat/potential divider/variable resistor/potentiometer/dimmer — B1

(b) **(i)** 0 (V) OR zero OR nothing — B1

(ii) 12 (V) — B1

(c) idea of increasing brightness as S moves from A to B — C1
appropriate correct comment on resistance or voltage — A1
[Total: 5]

11 **(a)** towards top of page — B1

(b) indication of battery connected correctly to the bare wires — B1
magnet's poles shown either side OR end OR above and below X — C1
magnetic field clearly vertical and interact with conductor — A1
[Total: 4]

12 **(a)**

inside	positive / + / +1	B1 + B1
outside	negative/ – / –1	B1 + B1
inside	no charge / nothing / neutral / 0	B1 + B1

(b) **(i)** electron — B1

(ii) electron — B1
[Total: 8]

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