

MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers

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 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 May/June 2012 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

- 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) BC OR 40 – 70 OR 2nd section B1
(ii) AB OR 0 – 40 OR 1st section B1
- (b) (i) area under graph OR speed \times time seen or used C1
70–40 OR 30 C1
 8×30 e.c.f. C1
240 (m) A1
- (ii) 7×10 OR average speed \times time
OR area of triangle + area of rectangle C1
70 (m) A1
- (c) line down from D to axis at 110s (need not be straight) B1
[Total: 9]
- 2 (a) 76 (cm Hg) B1
- (b) 60 – 50 C1
candidate's (a) + or – 10 e.c.f. C1
86 (cm Hg) c.a.o. A1
- (c) L.H. goes up B1
R.H. goes down B1
[Total: 6]
- 3 (a) diagonal, top L to bottom R, drawn (accept any part of this diagonal) B1
- (b) within range 23 – 27 ($^{\circ}$) B1
- (c) candidate's (b) B1
- (d) larger angle before toppling B1
[Total: 4]
- 4 (a) (i) gravitational/potential/GPE/PE B1
(ii) force/mass/weight AND height/distance C1
force/mass/weight of (basket) of rocks AND height/distance of cliff A1
- (b) chemical/chemical PE NOT just PE B1
- (c) time M1
to raise basket up cliff A1
[Total: 6]

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- 5 (a) clear cross/dot at centre of waves B1
- (b) wave approximating to a "sine" wave M1
equal spacing, by eye
amplitude greater at one end/centre than other } any 1 A1
waves above and below equilibrium line
- (c) (i) constant (in any direction) B1
same in all directions B1
- (ii) concentric circle M1
same spacing as others, by eye (allow free-hand drawing) A1
[Total: 7]
- 6 (a) 0 and 100 B1
- (b) (i) expands B1
- (ii) moves along the tube/up/to the right B1
stops at/near 100 mark/100°C/100/temp of boiling water B1
- (c) arrow pointing to somewhere between RH end of bulb & –10 mark B1
[Total: 5]
- 7 (a) any large surface, stated or example e.g. wall/cliff/mountain B1
- (b) (i) when hears bang/sees flash B1
- (ii) when hears echo B1
- (c) (i) use of 2.25 (s) C1
speed = distance/time in any form OR 2×distance/time C1
720/2.25 OR 360/2.25
allow e.c.f. from time, if working shown C1
320 (m/s) c.a.o. A1
- (ii) distance from firework } any 1 B1
reaction time, however expressed
stretching tape
wind
- [Total: 8]**

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- 8 (a) molecules/atoms/particles oscillating/vibrating B1
bigger vibrations/amplitude/spacing when heated B1
- (b) (i) appropriate situation + problem M1
e.g. telegraph wires + contract in cold weather A1
description of solution e.g. allowed to sag between poles
- (ii) appropriate example e.g. fitting metal tyres M1
description of procedure e.g. heat tyres before fitting A1
[Total: 6]
- 9 (a) moves/deflects M1
momentary (or equivalent) OR goes back to zero/centre A1
- (b) moves/deflects in other direction B1
- (c) e.m.f./electromagnetic force/current/voltage/p.d. B1
induced B1
(allow B1 for magnetic field is changed)
[Total: 5]
- 10 (a) line with negative slope throughout B1
negative intercept on I axis B1
- (b) $R = V/I$ in any form C1
2/5 C1
0.4 (A) A1
- (c) (i) 20 (Ω) B1
(ii) 0.1 (A) B1
- (d) idea of current halved, so resistance doubled C1
5 OR 5.0 (Ω) A1
- (e) heating and magnetism ticked –1 e.e.o.o. B2
[Total: 11]

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- 11 (a)** diagram:
 source, solid absorber, detector shown in line B1
- method:
 distance between source & detector small/<5cm B1
 take reading with no absorber B1
 insert sheet of paper/aluminium (ignore thickness) B1
 take reading with absorber present B1
- identification:
 if no/background reading with paper absorber, then α
 OR if still get a reading, then β B1
- (NOTE no mark for identification based on *Al* absorber)
- (b)** in range 15–20 (mins) B1
[Total: 7]
- 12 (a) (i)** nucleus B1
- (ii)** electron(s) B1
- (b) (i)** proton(s) B1
- (ii)** 2 B1
- (iii)** 4 at top B1
 2 at bottom B1
[Total: 6]