

**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 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  
(ii) AB OR 0 – 40 OR 1st section B1
- (b) (i) area under graph OR speed × 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 × 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 (cmHg) B1
- (b) 60 – 50 C1  
candidate's (a) + or – 10 e.c.f. C1  
86 (cmHg) 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 (°) 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
- (b) wave approximating to a "sine" wave  
 equal spacing, by eye  
 amplitude greater at one end/centre than other waves above and below equilibrium line } any 1
- (c) (i) constant (in any direction)  
 same in all directions
- (ii) concentric circle  
 same spacing as others, by eye (allow free-hand drawing)
- 6 (a) 0 and 100
- (b) (i) expands
- (ii) moves along the tube/up/to the right  
 stops at/near 100 mark/100°C/100/temp of boiling water
- (c) arrow pointing to somewhere between RH end of bulb & -10 mark
- 7 (a) any large surface, stated or example e.g. wall/cliff/mountain
- (b) (i) when hears bang/sees flash
- (ii) when hears echo
- (c) (i) use of 2.25 (s)  
 speed = distance/time in any form OR 2×distance/time  
 720/2.25 OR 360/2.25  
 allow e.c.f. from time, if working shown  
 320 (m/s) c.a.o.
- (ii) distance from firework  
 reaction time, however expressed  
 stretching tape  
 wind } any 1
- [Total: 7]
- [Total: 5]
- [Total: 8]

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

B1  
M1  
A1  
M1  
A1  
[Total: 6]

M1  
A1

B1

B1  
B1  
[Total: 5]

B1  
B1

C1  
C1  
A1

B1  
B1

C1  
A1

B2  
[Total: 11]

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- 11 (a) diagram:  
 source, solid absorber, detector shown in line
- 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  $\alpha$   
 OR if still get a reading, then  $\beta$  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]**