

MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers

0625 PHYSICS

0625/22

Paper 22 (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.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2010 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 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. **NOTE:** In this paper, note the M marks in questions
- 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.
- un.pen.** means "unit penalty". An otherwise correct answer will have one mark deducted if the unit is wrong or missing. This **only** applies where specifically stated in the mark scheme. Elsewhere, incorrect or missing units are condoned.
- 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** Ignore units, except where a mark is specified for a particular unit.
- 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
- 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) | 16 – 4 2.4 (cm) | C1 A1 | |
| | (b) | balance/spring balance/scales NOT weighing machine | B1 | |
| | (c) | mass/volume OR M/V 72/9 8 g/cm ³ | C1 C1 A1 B1 | [7] |
| 2 | (a) | no AND no arrow shown | B1 | |
| | (b) | accelerates it in same direction/opposite direction to exhaust gases | M1 A1 | |
| | (c) | slows it down) makes it hot) any 2 causes friction) | B1, B1 | [5] |
| 3 | (a) | oil nuclear fission (use ✓ + × = 0 for extras) | B1 B1 | |
| | (b) (i) | gas lamp/fire | B1 | |
| | (b) (ii) | electric motor OR loudspeaker | B1 | |
| | (b) (iii) | microphone | B1 | [5] |
| 4 | (a) | wall A AND bigger area lower pressure (on soil) | B1 B1 | |
| | (b) (i) | depth/height of air/atmosphere) density of air/atmosphere) any 2 (acceleration due to) gravity) | B1, B1 | |
| | | OR weight/force <u>of air</u> area | B1 B1 | |
| | (b) (ii) | 1. same 2. greater four times | B1 C1 A1 | [7] |

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| | | | | |
|---|---------|--|----------------|-----|
| 5 | (a) (i) | to the right | B1 | |
| | | (ii) they open | B1 | |
| | | (iii) current stops | B1 | |
| | | (iv) screw in control screw/rotate screw clockwise | B1 | |
| 5 | (b) (i) | 29 (minutes) | B1 | |
| | | (ii) $E = Pt$ $2000 \times \text{his(i)} \times 60$ 3.48×10^6 (J) c.a.o. | C1 C1 A1 | [8] |
| | | | | |
| 6 | (a) (i) | longitudinal movement clearly indicated | B1 | |
| | | (ii) 8.7–8.9 | B1 | |
| | | (iii) idea of more waves (in same distance)/shorter wavelength, however expressed Accept shown on Fig. 6.1 | B1 | |
| 6 | (b) (i) | vertical movement clearly indicated | B1 | |
| | | (ii) 2.5–2.7 | B1 | |
| | | (iii) idea of taller waves, however expressed Accept shown on Fig. 6.2 | B1 | [6] |
| 7 | (a) (i) | hits surface at right angles OR angle of incidence zero | B1 | |
| | | (ii) reflection shown at second surface at 45° to second surface correctly through third surface e.c.f. | M1 A1 B1 | |
| | | | | |
| 7 | (b) (i) | i and r both correctly marked | B1 | |
| | | (ii) $i = r$ in symbols or words NOT $\sin i = \sin r$ | B1 | |
| | | (iii) upper prism correctly positioned, by eye lower prism correctly positioned, by eye | B1 B1 | [8] |

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- 8 (a) close both S_1 and S_2 ticked B1
- (b) any 1 ticked C1
all 3 ticked A1
- (c) lamp would blow OR too much voltage/current B1
- (d) (i) 10 (Ω) B1
- (ii) $I = V/R$ in any form, symbols or numbers C1
6/10 OR 12/20 e.c.f. from (i) C1
0.6 c.a.o. A1
A B1 [9]
- 9 free, potential difference, current, resistance
4 correct scores B3
2 or 3 correct scores B2
1 correct scores B1 [3]
- 10 (a) (i) magnet which operates when there is a current
OR coil wrapped round iron bar B1
- (ii) can be switched on/off OR can be made very strong
OR can control its strength B1
- (b) mention of magnetic field B1
change in flux linkage, however expressed OR field lines being cut etc B1
induced emf/current/electricity B1
- (c) (i) magnetised B1
- (ii) attracted OR magnetised B1
- (iii) close B1
- (d) armature becomes permanently magnetised)
wouldn't release from core) any 2 B1, B1
contacts always closed) [10]

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- 11 (a) emission of electrons/charges/charged particles by means of heat B1
B1
- (b) (i) electrons ticked B1
- (ii) between plates
continuous upward deflection, any shape M1
smooth curve A1
- after plates
straight line in direction of final direction between plates
(allow 1 cm of curve beyond plates, before becomes straight) B1 [6]
- 12 (a) student C OR the last one B1
- (b) half-life ticked B1
- (c) (i) 4 (hours) B1
- (ii) 1 B1
- (iii) 17 hours (gives 100 cpm) C1
13 (hours) A1 [6]