

**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 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) A1
- (b) balance/spring balance/scales NOT weighing machine B1
- (c) mass/volume OR M/V C1
72/9 C1
8 A1
g/cm³ B1 [7]
- 2 (a) no AND no arrow shown B1
- (b) accelerates it M1
in same direction/opposite direction to exhaust gases A1
- (c) slows it down) B1, B1
makes it hot) any 2 [5]
causes friction)
- 3 (a) oil B1
nuclear fission B1
(use ✓ + × = 0 for extras)
- (b) (i) gas lamp/fire B1
- (ii) electric motor OR loudspeaker B1
- (iii) microphone B1 [5]
- 4 (a) wall A AND bigger area B1
lower pressure (on soil) B1
- (b) (i) depth/height of air/atmosphere) B1, B1
density of air/atmosphere) any 2 [5]
(acceleration due to) gravity)
- OR weight/force of air
area B1
B1
- (ii) 1. same B1
2. greater C1
four times 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
- (b) (i) 29 (minutes) B1
- (ii) $E = Pt$ C1
 $2000 \times \text{his(i)} \times 60$ C1
 3.48×10^6 (J) c.a.o. 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
- (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 M1
 at 45° to second surface A1
 correctly through third surface e.c.f. B1
- (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 B1
 lower prism correctly positioned, by eye 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]