

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the October/November 2007 question paper

0625 PHYSICS

0625/03

Paper 3 (Extended 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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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.

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NOTES ABOUT MARK SCHEME SYMBOLS

- 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.
- 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.

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- 1 (a) (i) 1.6s to 1.8s ALLOW 4.2 – 6s ALLOW 4.4 – 6s NOT 2s NOT 4.0 – 6s B1
- (ii) 6 – his (i), evaluated ALLOW 0 – 4.2s ALLOW 0 – 4.4s NOT 0 – 4s e.c.f. B1
- (iii) his (i) × 20 C1
 32 – 36m or his (i) × 20 evaluated
 allow B1 only for 40m with no working A1
- (iv) area under whole graph or $\frac{1}{2}vt + \text{his(iii)}$ C1
 70 – 95m A1
- (b) (i) weight of ball down and (air) resistance up)
 OR friction opposes weight)
 upward/resistance/friction force increases) any 3 B1×3
 with time/distance/speed/as ball falls)
 net force reduces)
 less force, so less acceleration)
- (ii) up force = down force OR no resultant force OR air res. = weight B1
 no net force, no acceleration/constant speed B1

[Total: 11]

- 2 (a) (i) down to R and up towards Q/S, then reverse OR equivalent B1
 OR back towards Q, then reverse B1
 continues backward and forward until stops (at R)
- (ii) idea of energy loss OR because of friction NOT PE/KE B1
- (b) (PE lost =) 1.2×0.5 OR 0.6 (J) OR $0.12 \times 10 \times 0.5$ OR mgh OR wt × dist C1
 i.e. evidence of mgh
- $0.5 \times 0.12 \times v^2 = mgh$ OR 0.6 etc. e.c.f. C1
 i.e. evidence of $\frac{1}{2}mv^2$
- 3.16 OR 3.2 m/s c.a.o. A1

[Total: 6]

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- 3 (a) any logical method e.g.
 extension is 2 cm for 8 N or 1 cm for 4 N C1
 final extension is 3 cm C1
 need 12 N to extend to 6 cm A1
- (b) (i) shown on diagram:
 distance from pivot to F OR value of weights OR dist from weights to pivot B1
- (ii) force/weight of load \times distance from pivot to force
 (accept symbols if clear) B1
- [Total: 5]**
- 4 (a) (i) random B1
 high speed (between collisions) B1
- (ii) hit walls B1
 many hits/unit area OR hit hard OR large force OR high energy
 OR many hits/s OR hit very often B1
- (b) particles vibrate (more) OR electrons gain energy B1
 particle to particle transfer OR flow of free electrons B1
- (c) 75×3200 OR ml C1
 $240\,000$ J OR 240 kJ OR 2.4×10^5 J A1
- [Total: 8]**
- 5 (a) take readings of the detectors B1
 fill box with water B1
 take readings (again) B1
- (b) dull black best AND shiny white worst B1
- (c) two different metals B1
 two junctions (could be at meter) hot and cold need not be indicated B1
 any cell, max B1,B0
- [Total: 6]**

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- 6 (a) mirror: 2 reflected rays approx correct M1
projected back to approx correct labelled image A1
note: images may be dots or lines
- lens: ray through F, correct by eye M1
ray through centre OR ray through other F, correct by eye M1
projected back to approx correct (labelled) image A1
- (b) (i) not produced by real rays crossing
OR cannot be caught on a screen
OR rays appear to come from image B1
- (ii) upright/right way up/erect c.a.o. B1
- (iii) lens image enlarged AND mirror image same size c.a.o.
OR (different) size OR (different) distance OR different side B1

[Total: 8]

- 7 (a) (i) diagram showing compressions and rarefactions
(could be either spaced vertical lines or dots, or coil or sine wave) B1
2C's and 2R's in approx correct place B1
- (ii) wavelength correctly marked, by eye B1
- (b) (i) all 3 in correct positions B1
- (ii) radio (waves) B1
- (iii) 3×10^8 m/s B1

[Total: 6]

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- 8 (a) circuit 1 series AND circuit 2 parallel B1
- (b) switch off each one separately)
 one fails, other works)
 both get full current/voltage/same voltage) any 2 B1+B1
 other good point e.g. more heat in parallel)
 lower resistance)
- (c) (total R =) 10 (Ω) C1
 (V =) 12V A1
- (d) $1/R = 1/4 + 1/6 (= 5/12)$ OR $1/R = 1/R_1 + 1/R_2$ C1
 2.4 (Ω) A1
- (e) (i) 3(A) B1
 (ii) 24W B1
 (iii) 7200J e.c.f. (ii) B1
- [Total: 10]**
- 9 (a) when magnetic field cuts/cut by conductor/wire/coil/solenoid B1
 OR change in magnetic field linked with coil etc. B1
 current/e.m.f caused B1
- (b) solenoid ends connected to meter/lamp note: any sign of a cell gets B0 B1
 magnet indicated in suitable position on axis of solenoid B1
- (c) insert/withdraw/move magnet into/out of solenoid B1
 meter gives reading (as magnet moves) OR watch the meter OR lamp glows B1
- (d) move magnet faster)
 increase strength of magnet) any 2 B1+B1
 more turns on solenoid)
 closer to solenoid)
- [Total: 8]**

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- 10 (a) (i) low/0/off/no output B1
- (ii) low/0/off/no output B1
- (b) (i) temp sensor to NOT gate input, correct symbol B1
output of NOT gate (condone incorrect symbol) and humidity
sensor to AND inputs (condone labelled box for AND gate) B1
- (ii) NOT low in, high out B1
AND both inputs high, high output B1
Note: B0, B0 for states on wrong diagram.

[Total: 6]

- 11 (a) detector, no source, no aluminium, take count OR take background B1
no aluminium, take count B1
aluminium, take count B1
subtract background/reading 1 from results B1
- (b) count decreases as thickness of aluminium increases B1
6-10 sheets/several sheets/few mm,
count reduced to background count/ β -particles stopped B1

[Total: 6]