

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**0625 PHYSICS**

**0625/21**

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 October/November 2011 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.
- 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** Answers are acceptable to any number of significant figures  $\geq 2$ , except if figures 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.

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Not/NOT Indicates that an incorrect answer is not to be disregarded, but cancelled out by an otherwise correct alternative offered by the candidate i.e. right plus wrong, or right plus wrong plus wrong applies.

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- 1 (a) (i) BC  
(ii) AB B1
- (b) area under graph C1  
 $0.5 \times 15 \times 5$  C1  
 37.5 (m) A1 [5]
- 2 (a) tape measure OR trundle wheel OR laser measure IGNORE metre rule B1
- (b) (i) clock OR watch (any sort) B1
- (ii) set clock/watch to zero OR note start time OR start clock/watch/timing B1  
 (start clock/watch/timing) when wood seen to fall or equivalent B1  
 stop clock/watch/note time when wood reaches bridge 2 B1
- (iii) speed = distance/ time in any form, letters, words, numbers C1  
 $50/400$  C1  
 $0.125$  A1  
 m/s B1 [9]
- 3 (a) (i) plumb-line (name or description) OR try-square and (horiz.) bench B1  
 OR spirit level
- (ii) line joining **A** and **D** M1  
 line joining **B** and **E** M1  
 intersection clearly labelled **G** (dependent on scoring both M marks) A1
- (b) X clearly on centre line B1  
 X clearly within semicircular portion, but not on surface B1 [6]
- 4 (a) dark specks OR bright specks NOT molecules/particles B1  
 moving C1  
 randomly/zigzag OR dancing about A1
- (b) Brownian motion/movement B1
- (c) invisible/too small to see/very small B1  
 moving fast/high kinetic energy B1  
 moving randomly/all directions B1 [7]
- 5 (a)  $150 \times 3$  C1  
 450 (Hz) A1

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- (b) any figure between 20 and 50 inclusive  
AND any figure between 15,000 and 25,000 inclusive
- (c) increases/rises B1 [4]
- 6 (a) ultrasound B1
- (b) (i) infra-red }  
visible } all 4 correct B2  
ultra-violet } (any 2 correct B1)  
X-rays }
- (ii) radio OR the top/first one B1
- (iii) infra-red B1
- (iv) X-rays OR gamma rays B1 [6]
- 7 (a) (i) needle inside coil B1  
current through coil OR connect battery/power supply M1  
direct current OR d.c.  
OR a.c. and switch off before removing needle/ magnet A1
- (ii) freely suspend/pivot and see which end points N (or equivalent)  
OR see which end is repelled by N pole of a magnet B1
- (b) 4+ smooth curves leaving one end and going to the other (ignore any arrows) B1  
no lines crossing or meeting, even at ends B1 [6]
- 8 (a) battery/ammeter connected wrong way round B1  
OR negative of battery should go to negative of ammeter
- (b) correct symbols for battery, ammeter and rheostat M1  
(allow common variants on battery/cell symbol)  
all components in series A1
- (c) voltmeter (any recognisable symbol) clearly in parallel with coil B1
- (d) (i) 2.8 (A) and 12 (V) both B1
- (ii) ammeter increases B1  
voltmeter increases B1
- (iii) 1.4 (A) OR half candidate's original reading B1  
6 (V) OR half candidate's original reading B1 [9]

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- 9 (a) transformer (ignore step-up/down)
- (b) 132,000/22,000 OR 240/132,000 C1  
 X: 6 A1  
 Y: 0.001818 to at least 4 dec. pl. OR 1/550 NOT 550 A1
- (c) less heat/energy loss }  
 thinner/smaller cables } any 2 use ✓ + × = 0 for incorrect extras B1+B1  
 less copper used }  
 less cable weight }  
 less massive pylons }  
 cheaper }  
 smaller current } [6]
- 10 (a) (electric) charge OR charged body B1  
 force B1
- (b) **A** and **B** closer together allow touching M1  
 threads straight and equal angle (by eye) to vertical A1
- (c) **E** horizontal to left }  
**W** vertically down } all 3 marked on his diagram -1 e.e.o.o. B2  
**T** up thread }
- (d) zero or 0 or nothing B1 [7]
- 11 (a) (i) filament/cathode clearly and correctly labelled B1  
 (ii) anode clearly and correctly labelled B1
- (b) (i) battery shown connected across filament (no e.c.f.) B1  
 (ii) power supply connected between filament & anode (no e.c.f.) B1  
 (iii) straight path shown along axis (no e.c.f.) B1
- (c) bright spot (or equivalent) B1
- (d) spot moves down B1 [7]
- 12 (a) points correctly plotted ( $\pm\frac{1}{2}$  small square) -1 e.e.o.o. B2  
 smooth curve through candidate's points (by eye) B1

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- (b) (i) 1. in range 2.2–3.0  
2. in range 18.0–19.0
- (ii) 2 half-lives  
(candidate's 2 – candidate's 1)/2  
7.5–8.6 (days) e.c.f.

B  
C1  
C1  
A1 [8]