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.

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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 ≥ 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.

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.

1	**(a)**	**(i)**	BC	B1	
		(ii)	AB	B1	
	(b)		area under graph	C1	
			0.5 × 15 × 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 OR spirit level	B1	
		(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 × 3		C1
			450 (Hz)		A1

(b) any figure between 20 and 50 inclusive
AND any figure between 15,000 and 25,000 inclusive — B1

(c) increases/rises — B1 [4]

6 **(a)** ultrasound — B1

(b) **(i)** infra-red, visible, ultra-violet, X-rays — all 4 correct (any 2 correct B1) — B2

(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
OR negative of battery should go to negative of ammeter — B1

(b) correct symbols for battery, ammeter and rheostat
(allow common variants on battery/cell symbol) — M1
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]

9 **(a)** transformer (ignore step-up/down) B1

(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
less copper used
less cable weight
less massive pylons
cheaper
smaller current
} any 2 use ✓ + × = 0 for incorrect extras B1+B1 [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
T up thread
} all 3 marked on his diagram –1 e.e.o.o. B2

(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 (±½ small square) –1 e.e.o.o. B2
smooth curve through candidate's points (by eye) B1

(b)	**(i)**	**1.** in range 2.2–3.0	B1	
		2. in range 18.0–19.0	B1	
	(ii)	2 half-lives	C1	
		(candidate's **2** – candidate's **1**)/2	C1	
		7.5–8.6 (days) e.c.f.	A1	[8]