UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0625 PHYSICS

0625/33 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, 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 October/November 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY *of* CAMBRIDGE
International Examinations

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.
<u>underlining</u>	indicates that this <u>must</u> 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 figures	Answers are acceptable to any number of significant figures $\geqslant 2$, except if specified otherwise, or if only 1 sig.fig. is appropriate.
Units	It is expected that all final answers will have correct units. Deduct one unit penalty for each incorrect or missing unit, maximum 1 per question. No unit penalty if unit is missing from final answer but is shown correctly in the working.
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

1	**(a)**	**(i)**	$(v - u)/t$ OR v/t OR 8/3	C1
			2.7 m/s^2	A1
		(ii)	*ma* OR 42 × answer from **(i)** OR 42 × 8/3	C1
			110/112 N e.c.f.	A1
		(iii)	(distance in 1st 3 secs =) 12 m OR (dist in last 3 secs =) 88 m	C1
			use of area of trapezium OR area of "top" triangle	C1
			7.7 m/s	A1
	(b)		longer time to top speed longer total time lower top speed lower finishing speed specific/all speeds lower (**not** speed decreases) less slope/less acceleration (in first section) greater slope/greater deceleration in 2nd section — any 2	B1+B1
				[Total: 9]
2	**(a)**		all four = 40 N OR all four add up to 160 N	B1
			upwards	B1
	(b)	**(i)**	W × 0.17/0.20/0.23 = 160 × 0.72/0.75/0.78	C1
			W × 0.17 = 160 × 0.78 **or** 600 N	C1
			730/734 N	A1
		(ii)	force by P = 160 + answer to **(i)** correctly evaluated	B1
			all others = 0	B1
				[Total: 7]
3	**(a)**	**(i)**	bombardment/collide by air molecules/particles/atoms	B1
		(ii)	lighter/very small/smaller than smoke particles/too small to be seen fast-moving/high kinetic energy random movement/movement in all directions — any 2	B1+B1
	(b)	**(i)**	increases (builds up)	B1
		(ii)	air molecules/particles/atoms bombard/hit walls	B1
			molecules faster/higher energy when temperature raised (**ignore** vibrate faster)	B1
			greater force (per unit area) OR more collisions (per second)	B1
				[Total: 7]

4	**(a)**	**(i)**	conduction	B1
		(ii)	molecules at hot end vibrate more/have high/more energy OR knocked by molecules/free electrons at hot end have more energy	B1
			energy/vibration transferred to neighbours/shared OR (energetic) electrons move along rod	B1
	(b)		copper is a bett**er** conductor OR iron is a poor**er** conductor (**ignore** electrical)	B1
	(c)		iron conducts heat slowly OR poor conduction by iron sideways from flame	B1
			above gauze: flame retains its energy OR gas hot enough to burn	B1
			copper conducts heat rapidly OR good conduction by copper sideways from flame	B1
			above gauze: gas not incandescent above gauze OR gas not hot enough to burn	B1
				[Total: 8]
5	**(a)**		heat/energy to raise/change temperature of 1 kg/g/unit mass through 1°C/1K/unit temperature	M1 A1
	(b)	**(i)**	darker colours absorb more OR lighter/shiny colours absorb less	B1
		(ii)	**1.** 182	B1
			2. (mass of 1m^2 =) volume × density OR $D = M/V$ OR (1 ×) 0.01 × 7800 78 kg	C1 A1
			3. $Q = mc\theta$ 182 = 78 × 450 × θ (e.c.f. from **1**,**2**) 0.00519 °C/s OR 5.19 × 10^{-3} °C/s (e.c.f. from **1**,**2**)	B1 C1 A1
				[Total: 9]

6	(a)		*mgh* OR 0.5 × 10 × 1.1 5.5 J	C1 A1
	(b)	(i)	1.5 (J)	B1
		(ii)	energy used to deform ball/ground OR strain energy stored in (deformed) ball/ground OR heat generated in deformed ball/ground	B1
	(c)		(initial energy =) 9 + answer to **(a)**, correctly evaluated use of $\frac{1}{2}mv^2$ 7.6 m/s	C1 C1 B1
				[Total: 7]
7	(a)		increases (as current increases) at an increasing rate	M1 A1
	(b)	(i)	25 Ω	B1
		(ii)	IR in any form OR 0.070 x 25 1.7/1.8 V	C1 A1
		(iii)	(P =) IV OR I^2R OR V^2/R in any form, numbers, symbols or words 0.12 W e.c.f. from **(i)**/**(ii)**	C1 A1
	(c)	(i)	answer to **(b)(ii)**	B1
		(ii)	use of $1/R = 1/R_1 + 1/R_2$ OR $R = R_1R_2/(R_1 + R_2)$ 12.5 Ω	C1 A1
				[Total: 10]
8	(a)		Fig.8.1 nothing seen/no current/no deflection/no voltage Fig. 8.2 deflection (of needle)/current in mV/voltage induced Fig. 8.3 deflection (of needle)/current in mV/voltage induced (**ignore** size of deflection) same direction as Fig. 8.2	B1 B1 M1 A1
	(b)		increase speed increase turns (of wire)/more coils (**ignore** longer wire) increase magnet strength (**ignore** larger magnet)	B1 B1 B1
				[Total: 7]

9	**(a)**	**(i)**	reduced		B1
		(ii)	reduced		B1
	(b)		$n = \dfrac{\text{speed in air/vacuum}}{\text{speed in medium/glass}}$	in any form	B1
			$2.0/2.03 \times 10^8$ m/s		B1
	(c)		reflection shown angle correct, by eye		M1 A1
					[Total: 6]
10	**(a)**	**(i)**	R in correct position, by eye		B1
		(ii)	3 reflected waves correctly meeting mirror) 3 reflected wave equidistant, by eye) 3 reflected waves centred on candidate's R)	-1 e.e.o.o.	B2
	(b)		1st ray + reflection correct by eye 2nd ray + reflection correct by eye reflected rays projected back, to meet behind mirror OR labelled I **and** in correct position		B1 B1 B1
					[Total: 6]
11	**(a)**		radioactivity is random/cannot be predicted		B1
	(b)	**(i)**	background		B1
		(ii)	radiation from surroundings/something specific in lab) radiation from soil/rocks (accept example)/^{14}C/Sun/) Earth/space/cosmic radiation/radon)	any 2	B1+B1
					[Total: 4]