MARK SCHEME for the October/November 2013 series

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



Page 2	Mark Scheme	Syllabus Par	
	IGCSE – October/November 2013	0625	33

NOTES ABOUT MARK SCHEME SYMBOLS & OTHER MATTERS

- M marks are method marks upon which further marks 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 marks can be scored.
- B marks are independent marks, which do not depend on other marks. For a B mark to scored, the point to which it refers must be seen specifically in the candidate's answers.
- A marks In general A marks are awarded for final answers to numerical questions. If a final numerical answer, eligible for A marks, is correct, with the correct unit and an acceptable number of significant figures, all the marks for that question are normally awarded. It is very occasionally possible to arrive at a correct answer by an entirely wrong approach. In these rare circumstances, do not award the A marks, but award C marks on their merits. However, correct numerical answers with no working shown gain all the marks available.
- C marks are compensatory marks in general applicable to numerical questions. These can be scored even if the point to which they refer are not written down by the candidate, **provided subsequent working gives evidence that they must have known it.** For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct substitution **or** working which shows he knew the equation, then the C mark is scored. A C mark is not awarded if a candidate makes two points which contradict each other. Points which are wrong but irrelevant are ignored.
- 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.
- e.e.o.o. means "each error or omission".
- o.w.t.t.e. means "or words to that effect".
- c.a.o. correct answer only
- Spelling Be generous about spelling and use of English. However, do not allow ambiguities e.g. spelling which suggests confusion between reflection/refraction/diffraction or thermistor /transistor/transformer.
- 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.
- Ignore indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – October/November 2013	0625	33

e.c.f. meaning "error carried forward" is mainly applicable to numerical questions, but may in particular circumstances be applied in non-numerical questions. This indicates that if a candidate has made an earlier mistake and has carried an incorrect value forward to subsequent stages of working, marks indicated by e.c.f. may be awarded, provided the subsequent working is correct, bearing in mind the earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but **only** applies to marks annotated e.c.f.

Significant figures

Answers are normally acceptable to any number of significant figures \geq 2. Any exceptions to this general rule will be specified in the mark scheme.

Units Deduct one mark for each incorrect or missing unit from an answer that would otherwise gain all the marks available for that answer: maximum 1 per question.

Arithmetic errors

Deduct one mark if the **only** error in arriving at a final answer is clearly an arithmetic one.

Transcription errors

Deduct one mark if the only error in arriving at a final answer is because given or previously calculated data has clearly been misread but used correctly.

Fractions Only accept these where specified in the mark scheme.

	Page 4			Mark Scheme	Syllabus	Paper	
				IGCSE – October/November 2013	0625	33	
1	(a)	(i)	(met	als/they are) (good) conductors (of heat)		B1	[1]
		(ii)	(at h or el	ot end) molecules vibrate (more) lectrons identified as mechanism of conduction		B1	
			mole or el	ecules collide with their neighbours lectrons move faster/have more energy		B1	
			ener or el	gy/vibration passed on lectrons pass on energy/reach far end/free to move		B1	[3]
	(b)	det imn det ρ =	ermin nerse ermin <i>m</i> /V	e mass of spoon (condone weigh provided word ma spoon in water/liquid e increase in volume/overflow or density = mass/volume	ass is used in ans	wer) B1 B1 B1 B1	[4]
						[Tota	l: 8]
2	(a)	(<i>W</i> 2.5	=) <i>m</i> g N	g or 0.25 × 10 or 250 × 10 or 2500		C1 A1	[2]
	(b)	(i)	limit exte	of proportionality or (the point where) proportionalit nsion stops or Hooke's Law no longer obeyed (cond	y between force a done elastic limit)	ind B1	[1]
		(ii)	grad 0.45	lient or numbers from graph divided e.g. $4.5 \div 10$ N/cm or 45 N/m		C1 A1	[2]
	(c)	(i)	0 (N) or zero or no net force etc. (ignore absent unit; wr	ong unit loses ma	ırk) B1	[1]
		(ii)	1. 2.	0.9N (accept 0.8N < value < 1.0N) (a =) <i>F/m</i> or 0.90/0.12 (e.c.f. from 2(c)(i)) 7.5m/s ² (e.c.f. from 2(c)(i))		B1 C1 41	[1] [2]
						[Tota	رع) [1: 9]
3	(a)	(W.D. =) <i>F</i> × <i>d</i> or 640 × 3.5 2240 J to 2 or more sig. figs.				C1 A1	[2]
	(b)	(i)	(<i>E</i> = 7500) <i>VIt</i> or 75 × 25 × 4.0 or 75 × 100 (accept (<i>E</i> =) <i>V</i> Q) J	and Q = It)	C1 A1	[2]
		(ii)	(effic	ciency =) $\frac{(\text{useful}) \text{ energy output}}{\text{ energy input}}$ (× 100%) or 2240/7	7500		
			(acc 0.3 c	ept power for energy) (e.c.f. from 3(a)(i) or 3(b)(i)) or 0.30 or 0.299 or 30% or 29.9% (e.c.f. from 3(a)(i)	or 3(b)(i))	C1 A1	

Page 5				Mark Scheme Syllabus		Paper			
				IGCSE – October/November 2013	0625	33			
	(c)	any elec frict W.E sou	B2	[2]					
						[Tota	l: 8]		
4	(a)	(i)	(GP) 34 J	E =) <i>mgh</i> or 0.40 × 10 × 8.5 (accept 9.8 for 10)		C1 A1	[2]		
		(ii)	KE = or 2	= GPE in any form or ½ <i>m</i> √ ² or 2 <i>gh</i> × 10 × 8.5 (e.c.f. from 4(a)(i)) ⇒ 170 or (y =)√170		C1			
			(e.c. 13 n	c.f. from 4(a)(i) m/s e.c.f. from 4(a)(i)	C1 A1	[3]			
	(b)	dra WD	drag or air resistance or friction with air (ignore wind for air) WD or energy lost as heat or more KE needed to overcome drag etc.						
	(c)	tran	eforn	ned to thermal energy/heat or friction/air resistance	slowe parachutist	down			
	(C)	or lost to air particles (not KE (accept KE of air), not GPE \rightarrow KE \rightarrow heat; ignore sound)					[1]		
			ITota	l: 81					
5	(a)	(nuo	nuclear) fusion		B1	[1]			
	(b)	(i)	sma (acc	ller (surface) area ept thinner, narrower(at top), ignore reference to lid)	B1	[1]		
		(ii) app wax		aratus: black object, white object, thermometer(s)/ba /level of water in vessel	all-bearing with	B1			
			sour	rce of heat e.g. Sun/radiant heater (condone light bu	lb/Bunsen burner)	B1			
		actio corr		on: (fill cans with water and) measure temperature ri pare volumes of water	se or wax melts o	r B1			
			obse incre	ervation: water in black can (better absorber) has gr ease / wax melts first / less water	eater temperature	R1	[4]		
			note	. emission experiment gains max. Z		DI	[+]		

	Page 6			Mark Scheme	Syllabus	Paper		
		IGCSE – October/November 2013 0625				33		
6	(a)	(Q/ <i>I</i> 1.2 (c = (allo	E =)	Pt or 2400 × 50 ⁵ (J) <i>n∆T</i> or 1.2 × 10 ⁵ /(1.5 × 32) (condone 2400/(1.5 × 32 c.f. from candidate's Q = 1.2 × 10 ⁵)	2))	C1 C1 C1		
		2.5 (allo	2.5×10^3 J/(kg °C) or 2.5 J/(g °C) (condone missing brackets) (allow e.c.f. from candidate's Q = 1.2×10^5)					
	(b)	(stu	denť	s value) too large and heat lost to surroundings/ket	le/evaporation	B1	[1]	
						[Tota	al: 5]	
7	(a)	n = or 2 0.96 75/7	sin <i>il</i> ! 25° 641 74.6°	sin <i>r</i> or <i>n</i> = sin <i>r</i> /sin <i>i</i> or (sin <i>i</i> =) 1.5 sin 40(°) i or (si to 2 or more sig. figs.	n r =) 1.5 sin 40(°) C1 C1 A1	[3]	
	(b)	(i)	(<i>v</i> =) 2.01	$f\lambda$ or 3.8 × 10 ¹⁴ × 5.3 × 10 ⁻⁷ × 10 ⁸ m/s to 2 or more sig. figs.		C1 A1	[2]	
		(ii)	(<i>c</i> =) 3.02 (e.c.	nv or 1.5 × 2.0/2.01/2.014 × 10 ⁸ (e.c.f. from 7(b)(i)) × 10 ⁸ m/s (accept 3 or 3.0 × 10 ⁸ m/s only with wor f. from 7(b)(i))) king)	C1 A1	[2]	
	(c)	wav alor wav 90°	wave(front) hits/enters the plastic at the same time or incident ray perpendicular along normal/at 90° or $i = 0^{\circ}$ (condone it doesn't hit at an angle) wave(front) all slows down at the same time or refracted ray perpendicular normal 90° or $r = 0^{\circ}$ by calculation			lar B1 rmal/at B1	[2]	
						[Tota	al: 9]	
8	(a)	(i)	half- horiz	wave rectified trace (ignore horizontal lines) zontal lines and wavelength same and amplitude sa	me/slightly reduce	M1 ed		
		(≥ ³⁄		A ₀ by eye)		A1	[2]	
		(ii)	recti (con	fier or suitable device or produce d.c. (from a.c. for done flashing lamp of some sort)	electronic circuits	5) B1	[1]	
	(b)) (lamp becomes) dimmer/less bright/flashes on and off						
		less (thermal)energy/heat/power or (thermal) energy etc. for less time or current becomes zero					[2]	
							al: 5]	

	Pa	ige 7		Mark Scheme	Syllabus	Paper	
				IGCSE – October/November 2013	0625	33	
9	(a)	(alternating current causes alternating/changing) magnetic field (in core) alternating/changing magnetic field in secondary coil voltage/e.m.f. induced (in secondary coil) more turns (on secondary) so greater output					[4]
	(b)	(i)	resis (ene (in c	stance increases (with/is proportional to length (of carrier of the stance (of cables)/heating in ables)/ <i>I</i> ² <i>R</i>	able)) cables/electrical v	B1 working B1	[2]
		(ii)	redu more	ced resistance or less heat loss e metal or cables heavier or more pylons or more c	ostly to construct	B1 B1	[2]
						[Tota	al: 8]
10	(a)	 (i) at least two lines (one left, one right) outside the coil of correct shape or at least two vertical lines inside the coil or two diverging and one central line at top and bottom at least four lines (two left, two right) outside the coil of correct shape or at least two lines (one left, one right) outside the coil of correct shape) and at least two 					
		(crossing or complete loops outside coil gains maximum of 1)				A1	[2]
		(ii)	lines	closer where field is stronger o.w.t.t.e. or vice vers	a or spacing of li	nes B1	[1]
	(b)	redı (inc	uces reasi	(strength of) field ng the resistance) reduces the current		B1 B1	[2]
	(c)	(i)	curv well-	ed path upwards (might curve back to the left) drawn curved path (no straight section and circular	by eye)	B1 B1	[2]
		 (ii) curves in opposite direction to (c)(i) magnetic field reversed 		B1 B1	[2]		
				[Tota	al: 9]		
11	(a)	12 (count	s/min		B1	[1]
	(b)	(i)	72 c	ounts/min (e.c.f. from 11(a))		B1	
		(ii)	9 co 1 co	unts/min (note: if background not subtracted, (i) 84 mpensatory mark)	and (ii) 21 gains	B1	[2]
	(c)	9/72 or (3.0	2 or 1 e.c.f. minu	/8 or 3 (half-lives)) 21/84 or 1/4 or 2 (half-lives) tes or 4.5 minutes (i.e. background not subtracted b	out otherwise corr	C1 rect) A1	[2]
		[al: 5]