Location Entry Codes

UNIVERSITY of CAMBRIDGE
International Examinations

As part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

Question Paper	Mark Scheme	Principal Examiner's Report
Introduction	Introduction	Introduction
First variant Question Paper	First variant Mark Scheme	First variant Principal Examiner's Report
Second variant Question Paper	Second variant Mark Scheme	Second variant Principal Examiner's Report

Who can I contact for further information on these changes?
Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2008 question paper

0625 PHYSICS

0625/31 Paper 31 (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.

CIE is publishing the mark schemes for the October/November 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – October/November 2008	0625	31

NOTES ABOUT MARK SCHEME SYMBOLS AND 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 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

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.

Work which has been crossed out, but not replaced, should be marked as if it had not been crossed out.

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – October/November 2008	0625	31

1	(a)	(i)	any mention of force or weight ignore mass		C1	
			Force to left > force to right	)		
			OR resultant force	) any 1	A1	
			OR unbalanced force	)		
			OR weight > friction	)		
		(ii)	to overcome/compensate for friction/resistance		B1	
	(b)		2/2.5 or 4/5 etc. or F/a or F = ma		C1	
			0.8 kg		A1	
	(c)		0.7/0.8 e.c.f. from **(b)**		B1	
			0.875 (m/s^2) e.c.f. from **(b)** could be scored on table (no unit needed)		B1	
	(d)	(i)	v = at or 0.5×1.2		C1	
			0.6 m/s		A1	
		(ii)	any velocity × time or speed × time		C1	
			0.36 m c.a.o. (note: 0.72 m gets C1, A0)		A1	[11]
2	(a)		two masses chosen with ratio 2:1 or 3:1 or 3:2		M1	
			chosen masses in correct holes to balance		A1	
	(b)		disc does not rotate/is balanced/in equilibrium/no movement		B1	
			NOT spin the disc NOT anything to do with calculating moments			
			NOT when disturbed, returns to original position			
	(c)		moment of one mass correct (ignore units)			
			accept mass × distance calculated		B1	
			equal answers		B1	
	(d)		correct addition of masses/weights, including 200g		B1	
			any mass correctly converted to N		B1	[7]
3	(a)	(i)	hdg or $70 \times 1050 \times 10$		C1	
			735 000 Pa or 7.35×10^5 Pa accept N/m^2 for Pa		A1	
		(ii)	8.35×10^5 Pa OR his **(a)(i)** + 1.0×10^5 accept N/m^2 for Pa		B1	
	(b)		pressure × area or P = F/A or $6.5 \times 10^5 \times 2.5$		C1	
			1.625×10^6 N		A1	
	(c)		because density is less accept new calculation of pressure			
			OR because salt water is denser		B1	[6]

4 **(a)** typical random path drawn, at least 3 abrupt changes of direction B1

(b) air molecules hit dust particles in all directions/move it in all directions B1
just as likely to be up as down B1
(allow marks scored on diagram)

(c) random movements smaller OR slower movement
OR less energy OR movement decreases B1 [4]

5 **(a)** **(i)** funnel no longer giving heat to ice OR ice at M.P./constant temp
OR heater reached max temp B1

(ii) inside of large pieces could be well below freezing point)
OR smaller air gaps if pieces smaller) any 1 B1
OR better contact between heater and ice)
OR to ensure heat from heater only goes to the ice)
OR larger surface area)
Ignore ice melts faster

(b) mass of beaker NOT mass of ice NOT mass of water B1
mass of beaker + water B1
(apply ✓ + × = 0 for extras other than power & time)

(c) (mass of ice melted by heater = 16.3 – 2.1) = 14.2 g C1
ml in any form, words, symbols or numbers C1
Wt or Pt in any form, words, symbols or numbers accept VIt C1
338 J/g OR 338 000 J/kg c.a.o A1 [8]

6 **(a)** light of one colour/frequency/wavelength B1

(b) n = sin$r$/sin$i$ OR n = sin$i$/sin$r$ in any form C1
sin$r$/sin30 = 1.49 OR sin$r$ = 1.49 × sin30 C1
48.0° – 48.2° A1

(c) ray at angle >30° and <60° to normal, by eye, correct way **NO** e.c.f. B1
Ignore any angles or labelling

(d) colours/spectrum would appear OR range of angles (ignore "rainbow")
OR dispersion OR ray splits up B1

(e) 90° approx (accept any value 80° to 90°) B1

(f) (totally internally) reflected OR T.I.R. ignore not refracted B1 [8]

Page 5	Mark Scheme	Syllabus	Paper
	IGCSE – October/November 2008	0625	31

7 **(a)** clear attempt at arcs of circles, at least 3 — B1
same wavelength as incoming waves, by eye
(ignore shape ignore distance to first wave) — B1
centre of curvature of arcs at centre of gap, by eye — B1

(b) speed/wavelength or 20/2.5 or $v = f\lambda$ — C1
8 Hz or 8 s^{-1} or 8 waves/second — A1

(c) his **(b)** or "the same" — B1 [6]

8 **(a)** changes a.c. to d.c. OR rectifies a/c OR allows current to flow one way only
OR prevents current flowing backward — B1

(b) $I \times t$ or 2×12 or $2 \times 12 \times 60 \times 60$ or amps × seconds — C1
24 Ah or 86 400 C or 86 000 C — A1

(c) emf = J/C OR energy converted/work done per unit charge/coulomb
OR W/A OR volts/p.d. when no current in circuit — C1
12 J of energy are delivered/needed for every coulomb of charge
OR 12 W is the power to drive a current of 1 A — A1

(d) **(i)** series connection shown, any recognisable symbols — B1

(ii) total power = 16 W OR 8/6 — C1
1.33 A accept fraction c.a.o. — A1

(iii) any power × any time or $16 \times 60 \times 60$ or IVt or $8 \times 60 \times 60$ — C1
57 600 J or 0.016 kWh or 28 800 J or 0.008 kWh — A1 [10]

9 **(a)** pump water to higher level storage)
or heat water) any one — B1
or charge accumulators/batteries)
ignore charge capacitor NOT generator

(b) less/no energy/power/heat loss OR to reduce current
OR to allow thinner cables OR more efficient NOTHING ELSE — B1

(c) I^2R — B1

(d) $N_s/1200 = 32000/1100$ OR $N_1/N_2 = V_1/V_2$ in any arrangement — C1
34 880 or 34 900 or 34 909 or 34 910 or 35 000 — A1

(e) input power = output power or $V_1I_1 = V_2I_2$ — C1
current = power/voltage in any form, words, symbols or numbers — C1
25 A — A1 [8]

10	**(a)**	**(i)**	LDR correctly identified	B1	
		(ii)	lamp correctly identified	B1	
		(iii)	transistor correctly identified	B1	
	(b)		(ignore anything that is in terms of currents) resistance of LDR becomes high	M1	
			LDR gets larger share of the voltage OR voltage across LDR gets bigger	A1	
			transistor switches/turns lamp on	A1	[6]
11	**(a)**		A cathode OR electron gun B Y plates OR vertical deflection plates C X plates OR horizontal deflection plates D screen OR fluorescent/phosphor OR tube NOT glass 4 correct B2, 3 or 2 correct B1	B2	
	(b)		A; idea of releasing electrons/thermionic emission	B1	
			B; move the electron beam vertically	B1	
	(c)	**(i)**	y-plates/y-input or B **NO** e.c.f.	B1	
		(ii)	x-plates/x-input or C **NO** e.c.f.	B1	[6]

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1 **(a)** idea of accelerating force/force down slope = friction force
OR no resultant force/forces balanced B1
(accept energy argument if Physics correct)

(b) **(i)** idea of accelerating force/force down slope > friction force
OR forces unbalanced B1
(accept energy argument if Physics correct)

(ii) F = ma NOT f α a B1

(iii) 12 × 2 C1
24N A1

(c) **(i)** resultant force = 38N OR his **(b)(iii)** + 14 C1
38/12 OR (his **(b)(iii)** + 14)/12 C1
3.166 m/s^2 or 3.17 m/s^2 or 3.2 m/s^2 NOT 3.16 e.c.f. A1

(ii) v = at or 3.2 × 2.5 e.c.f. C1
7.8 – 8.0 m/s e.c.f. A1

(d) idea of acceleration B1 [11]

2 **(a)** two masses chosen with ratio 2:1 or 3:1 or 3:2 M1
chosen masses in correct holes to balance A1

(b) disc does not rotate/is balanced/in equilibrium/no movement B1
NOT spin the disc NOT anything to do with calculating moments
NOT when disturbed, returns to original position

(c) moment of one mass correct (ignore units)
accept mass × distance calculated B1
equal answers B1

(d) correct addition of masses/weights, including 200 g B1
any mass correctly converted to N B1 [7]

3 **(a)** **(i)** hdg or 70 × 1050 × 10 C1
735 000 Pa or 7.35 × 10^5 Pa accept N/m^2 for Pa A1

(ii) 8.35 × 10^5 Pa OR his **(a)(i)** + 1.0 × 10^5 accept N/m^2 for Pa B1

(b) pressure × area or P = F/A or 6.5 × 10^5 × 2.5 C1
1.625 × 10^6 N A1

(c) because density is less accept new calculation of pressure
OR because salt water is denser B1 [6]

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE – October/November 2008	0625	32

4 (a) typical random path drawn, at least 3 abrupt changes of direction — B1

(b) air molecules hit dust particles in all directions/move it in all directions — B1
just as likely to be up as down — B1
(allow marks scored on diagram)

(c) random movements smaller OR slower movement
OR less energy OR movement decreases — B1 [4]

5 (a) (i) funnel no longer giving heat to ice OR ice at M.P./constant temp
OR heater reached max temp — B1

(ii) inside of large pieces could be well below freezing point)
OR smaller air gaps if pieces smaller) any 1 — B1
OR better contact between heater and ice)
OR to ensure heat from heater only goes to the ice)
OR larger surface area)
Ignore ice melts faster

(b) mass of beaker NOT mass of ice NOT mass of water — B1
mass of beaker + water — B1
(apply ✓ + × = 0 for extras other than power & time)

(c) (i) Pt/Wt in any form, words, symbols or numbers — C1
mcθ in any form, words, symbols or numbers — C1
4.88 or 4.9 J/(gK) or J/(g°C) or J/(gdegC) condone no brackets — A1
Or 4880 or 4900 J/(kgK) etc. accept double solidus in unit

(ii) heat lost/gained OR impurities in water — B1 [8]

6 (a) (i) light of one colour/frequency/wavelength — B1

(ii) n = sin*r*/sin*i* OR n = sin*i*/sin*r* in any form — C1
1.33 = sin*r*/sin40 OR sin*r* = 1.33 × sin40 — C1
Any value between 58.68° – 60° inclusive — A1

(iii) ray correct, by eye, bent away from normal
ignore any arrows or labelling **NO** ecf — B1

(b) (i) reflected (at B) or T.I.R. NOT deflects/refracts — M1
angle of incidence bigger than critical angle
or 50° is bigger than 48.8°/C.A. — A1

(ii) ray correct, by eye, with no refracted part ignore any arrows — B1 [8]

7	(a)	clear attempt at arcs of circles, at least 3		B1	
		same wavelength as incoming waves, by eye			
		(ignore shape ignore distance to first wave)		B1	
		centre of curvature of arcs at centre of gap, by eye		B1	
	(b)	speed/wavelength or 20/2.5 or $v = f\lambda$		C1	
		8 Hz or 8 s^{-1} or 8 waves/second		A1	
	(c)	his **(b)** or "the same"		B1	[6]
8	(a)	changes a.c. to d.c. OR rectifies a/c OR allows current to flow one way only			
		OR prevents current flowing backward		B1	
	(b)	$I \times t$ or 2×12 or $2 \times 12 \times 60 \times 60$ or amps × seconds		C1	
		24 Ah or 86 400 C or 86 000 C		A1	
	(c)	emf = J/C OR energy converted/work done per unit charge/coulomb			
		OR W/A OR volts/p.d. when no current in circuit		C1	
		12 J of energy are delivered/needed for every coulomb of charge			
		OR 12 W is the power to drive a current of 1 A		A1	
	(d) (i)	series connection shown, any recognisable symbols		B1	
	(ii)	total power = 16 W OR 8/6		C1	
		1.33 A accept fraction c.a.o.		A1	
	(iii)	any power × any time or $16 \times 60 \times 60$ or IVt or $8 \times 60 \times 60$		C1	
		57 600 J or 0.016 kWh or 28 800 J or 0.008 kWh		A1	[10]
9	(a)	pump water to higher level storage	)		
		or heat water	) any one	B1	
		or charge accumulators/batteries	)		
		ignore charge capacitor NOT generator			
	(b)	less/no energy/power/heat loss OR to reduce current			
		OR to allow thinner cables OR more efficient NOTHING ELSE		B1	
	(c)	I^2R		B1	
	(d)	$N_s/1200 = 32000/1100$ OR $N_1/N_2 = V_1/V_2$ in any arrangement		C1	
		34 880 or 34 900 or 34 909 or 34 910 or 35 000		A1	
	(e)	input power = output power or $V_1I_1 = V_2I_2$		C1	
		current = power/voltage in any form, words, symbols or numbers		C1	
		25 A		A1	[8]

10 (a) (i) LDR correctly identified B1

(ii) lamp correctly identified B1

(iii) transistor correctly identified B1

(b) (ignore anything that is in terms of currents)
resistance of LDR becomes high M1
LDR gets larger share of the voltage OR voltage across LDR gets bigger A1
transistor switches/turns lamp on A1 [6]

11 (a) A cathode OR electron gun
B Y plates OR vertical deflection plates
C X plates OR horizontal deflection plates
D screen OR fluorescent/phosphor OR tube NOT glass
4 correct B2, 3 or 2 correct B1 B2

(b) A; idea of releasing electrons/thermionic emission B1
B; move the electron beam vertically B1

(c) (i) y-plates/y-input or B **NO** e.c.f. B1

(ii) x-plates/x-input or C **NO** e.c.f. B1 [6]