CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the November 2003 question papers

0625 PHYSICS

0625/01	**Paper 1 (Multiple Choice), maximum mark 40**
0625/02	**Paper 2 (Core), maximum mark 80**
0625/03	**Paper 3 (Extended), maximum mark 80**
0625/05	**Paper 5 (Practical), maximum mark 60**
0625/06	**Paper 6 (Alternative to Practical), maximum mark 40**

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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 November 2003 question papers for most IGCSE and GCE Advanced Level syllabuses.

Grade thresholds taken for Syllabus 0625 (Physics) in the November 2003 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	40	-	27	23	19
Component 2	80	-	51	39	29
Component 3	80	54	33	-	-
Component 5	60	49	39	31	24
Component 6	40	31	24	18	13

The threshold (minimum mark) for B is set halfway between those for Grades A and C.
The threshold (minimum mark) for D is set halfway between those for Grades C and E.
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.
Grade A* does not exist at the level of an individual component.

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 0625/01

PHYSICS
Paper 1 (Multiple Choice)

Question Number	*Key*	*Question Number*	*Key*
1	**D**	21	**A**
2	**C**	22	**D**
3	**A**	23	**C**
4	**C**	24	**B**
5	**C**	25	**A**
6	**B**	26	**B**
7	**C**	27	**B**
8	**A**	28	**B**
9	**C**	29	**B**
10	**D**	30	**D**
11	**D**	31	**C**
12	**B**	32	**C**
13	**D**	33	**B**
14	**D**	34	**B**
15	**D**	35	**B**
16	**A**	36	**C**
17	**D**	37	**A**
18	**A**	38	**A**
19	**B**	39	**C**
20	**B**	40	**A**

TOTAL 40

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0625/02

PHYSICS

Paper 2 (Core)

NOTES ABOUT MARK SCHEME SYMBOLS

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 the 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 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 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** applied 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 **must** be seen in the answer offered, or something very similar.

Un.pen. — means 'unit penalty'. An otherwise correct answer will have one mark deducted if the unit is wrong or missing. This **only** applies where specifically stated in the mark scheme. Elsewhere, incorrect or missing units are condoned.

OR/or — indicates alternative answers, any one of which is satisfactory for scoring the marks.

QUESTION			SCHEME	TARGET GRADE	
1	(a)	(i)	G within block, to left of vertical through midpoint or AB	F	B1
		(ii)	Vertical line shown through A	C	B1
	(b)		A	F	M1
			more stable (or equivalent statement) e.g. less likely to topple or "weight within base"	F	A1
	(c)		so it does not topple over (or equivalent)	F	B1
					5
2			reference mark on wheel		*"(use stopwatch to) time…" gets only one of these
			datum line (could be "top" or "bottom")		
			*start timing/stopwatch as mark passes datum line		
			time a number of rotations (accept 1 here)	5C	B5
			time at least 20 rotations	any 5	
			*stop stopwatch		
			divide time by number of rotations		
			repeat		
			make sure stopwatch at zero		5
3			gravitational OR potential OR PE OR GPE	F	B1
			motion OR KE OR kinetic		
			heat/internal/thermal (any order (–1 eeoo))	3F	B3
			sound		
			heat (accept potential)	C	B1
			OR internal/thermal		
			NOT strain potential/NOT chemical potential		
			NOT sound, even as an extra		5
4	(a)		vehicle 2	F	M1
			large(r) area (in contact with ground)	C	A1
			low/less pressure	C	A1
			less likely to sink/get stuck	F	A1
	(b)	(i)	small area	F	C1
			large pressure	F	B1
		(ii)	(weight spread over) large(r) area NOT body area	C	B1
			small/less pressure	C	B1
			reference to weight somewhere in **(b)**	C	B1
					9
5	(a)	(i)	ray perpendicular to surface at A (by eye)	F	B1
		(ii)	normal at B correct (by eye)	F	B1
		(iii)	ray refracted down at B, but NOT along surface	C	B1
		(iv)	normal at D correct (by eye)	F	B1
		(v)	ray refracted up at D, but NOT along surface	C	B1

	(b)		converging OR will meet OR *one up, one down ALLOW * "opposite"	C	*only if diagram acc
			same deviation (or equivalent) OR "angles of refraction same"	C	B1
	(c)		straight on OR split (depending on thickness of "ray") OR no change (indirection) OR not refracted	F	B1
					8
6	**(a)**	**(i)**	speed	F	B1
		(ii)	frequency, ALLOW wavelength	C	B1
		(iii)	wavelength	F	B1
	(b)		gamma OR γ OR cosmic	C	B1
			condone x-rays as an extra		4
7	**(a)**		straight line sloping up to right	F	B1
			through origin	F	B1
	(b)	**(i)**	voltmeter OR multimeter on volts range (condone spelling)	F	B1
		(ii)	potential difference OR p.d. OR volts/voltage (**no** e.c.f.)	F	B1
		(iii)	ammeter OR multimeter on current/amps range (condone spelling)	F	B1
		(iv)	current OR intensity OR amps/amperes OR ampage (**no** e.c.f.) NOT A	F	B1
		(v)	evidence of 7.5	F	C1
			evidence of 0.3	F	C1
			7.5/0.3 OR V/I OR volts/current e.c.f. if written down	C	C1
			25 e.c.f. only if V/I used	C	A1
			Ω or ohm	C	B1
		(vi)	hisR/50	F	C1
			0.5 (Ω/m) e.c.f.	C	A1
					13

8	**(a)**		EITHER	OR		
			iron filings	(plotting) compass	F	B1
			NOT "put" sprinkle/spread/pour/scatter	place near end of magnet	F	B1
			tap card	mark end(s) of compass	C	B1
			further detail	further detail	C	B1
	(b)		attraction of compass S pole	any 1	F	B1
			repulsion of compass N pole			
			attraction of S pole of another magnet			
			repulsion of N pole of another magnet			
			attraction of Earth's N pole			
			repulsion of Earth's S pole			5

9	**(a)**	**(i)**	decreases		F	
			by 2		C	A1
		(ii)	decreases		F	M1
			by 2		C	A1
		(iii)	decreases		C	B1
	(b)		66 (yrs)		F	C1
			evidence of 3 half-lives		C	C1
			fraction 1/8 seen or implied		C	C1
			400		C	A1
						9
10	**(a)**		points plotted correctly $\pm\frac{1}{2}$ small square (–1 eeoo) ignore 0,0 (–1 for very large blobs)		3F	B3
	(b)		45 circled OR 2 circles ACCEPT point circled on graph		F	B1
	(c)		idea of stretching more than before (for same load increase) OR reference to elastic/proportional limit in some way		C	B1
	(d)		EITHER	OR		
			measure unloaded length ALLOW "measure spring" NOT extension	idea of fixed end and free end	F	B1
			measure loaded length NOT extension	note position of free end, no load	F	B1
			subtract	measure movt. free end, loaded	F	B1
						8
11	**(a)**	**(i)**	100		F	B1
		(ii)	0		F	B1
		(iii)	indication to the left of 0°C mark		C	B1
	(b)		expansion of a solid expansion of a gas/pressure of a gas current/pd/e.m.f. of a thermocouple conductivity/resistance of a conductor/wire/thermistor…. any 1 colour of a hot wire melting of a wax NOT expansion of alcohol ACCEPT density of a liquid		C	B1
						4
12	**(a)**		$N_1/N_2 = V_1/V_2$ in any form		F	C1
			$8000/N_2 = 240/6$ or correct substitution into correct equation		F	C1
			200	ALLOW B1 for 20 if 800 used instead of 8000 (working must be shown)	F	A1
	(b)	**(i)**	200 e.c.f. i.e. his **(a)**		F	B1
		(ii)	400 e.c.f. i.e. 2 x his **(a)**, evaluated		C	B1
						5

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0625/03

PHYSICS
Paper 3 (Extended)

1	**(a) (i)**	7(.0 s)	**A1**	
	(ii)	PQ or 0 – 2s or other correct description	**A1**	
		distance = av. speed x time or area under graph	**C1**	
		distance 11 x 2 m= 22 m	**A1**	**4**
	(b) (i)	deceleration (now) uniform (test 2)	**B1**	
		slower/lower (average) value/value between that of PQ and QR/takes longer (or values) time to come to rest.	**B1**	
	(ii)	deceleration = change in speed/time or 15/8	**C1**	
		value = 1.9 m/s^2	**A1**	**4**
	(c) (i)	graph shows constant acceleration	**B1**	
		force = ma (and m is also constant) so force is constant	**B1**	
	(ii)	towards the centre of the motion/circle	**A1**	**3**
				[11]
2	**(a)**	pressure = depth x g x density of water	**C1**	
		pressure = 50 x 10 x 1000	**C1**	
		so value is 500 000 Pa or N/m^2	**A1**	**3**
	(b)	force = pressure x area in any form	**C1**	
		force = 500 000 x 0.15 x 0.07	**C1**	
		force = 5250 N	**A1**	**3**
				[6]
3	**(a)**	one slightly nearer the centre than the other	**C1**	
		20 kg is the nearer one to the pivot	**A1**	**2**
	(b)	Clockwise moments = anticlockwise moments (about point/pivot)	**A1**	**1**
		(accept opposite directions and equal)		
	(c)	18x2.5=20xB	**C1**	
		distance = 2.25(m)	**A1**	**2**
				[5]
4	**(a)**	Some have extra/more energy than others	**B1**	
		most energetic leave surface/ break liquid bonds etc	**B2**	**M2**
	(b)	evaporation occurs strictly at the surface/at all temperature	**B1**	
		boiling occurs throughout liquid/ at one temperature (at normal at. pr.)/100°C	**B1**	**2**
	(c)	energy supplied = Wt /60 x 120	**C1**	
		sp.latent heat = energy/mass evaporated or 60 x 120/3.2	**C1**	
		value is 2250 J/g	**A1**	**3**
				[7]
5	**(a) (i)**	nitrogen	**M1**	
	(ii)	copper-solid-molecules very tightly bonded together so separate little	**B1**	
		water – liquid – molecules less tightly bonded/still small separation	**B1**	
		nitrogen – gas – molecules “free” and not bonded so separate most	**B1**	**M3**
		(N.B. accept 2 bonding statements for 2 marks. 1 separation statement for 1 mark)		

	(b)	**(i)**	size of movement/change in length of liquid column per degree	**B1**	
		(ii)	change in length (of liquid column) same for all degrees	**B1**	
					[5]
6	**(a)**		3 more roughly circular	**B1**	
			all drawn clearly circular, stop (well) clear of barrier and centred on slit	**B1**	
			wavelength constant throughout, both sides of barrier	**B1**	**3**
	(b)		wavelength – speed/frequency in any form	**C1**	
			values substituted correctly	**C1**	
			answer 6 x 10 m	**A1**	**3**
					[6]
7	**(a)**		two dots, marked F, each 5.0 cm from the lens	**A2**	**2**
	(b)		each correct ray one mark	**M2**	**2**
	(c)		correct image, labeled I	**A1**	**1**
	(d)		rays pass along the axis undeviated/object distance same for all object/rays meet at same distance on image/image distance same for all image	**B1**	**1**
	(e)		magnifying glass/eyepiece of telescope or microscope	**B1**	**1**
					[7]
8	**(a)**	**(i)**	0-6 (V) positive and negative	**A1**	
		(ii)	all waves roughly 6V amplitude	**B1**	
			3 waves approx. one wave every 0.1 s	**B1**	**3**
	(b)		any mention of magnetic field	**B1**	
			coils (forced to) cut magnetic field	**B1**	
			<u>includes</u> e.m.f./voltage/current in the coils	**B1**	
			as in Fleming's R.H. rule	**B1**	**M3**
	(c)		mechanical energy/work (in)/kinetic energy	**B1**	
			electrical (out) (+ heat) (ignore sound)	**B1**	**2**
					[8]
9	**(a)**	**(i)**	regular (but)/not normal (sine) wave/several waves added together etc.	**B1**	
		(ii)	1.6(V)	**A1**	
		(iii)	connect known voltage to Y plates (without any changes to C.R.O.)	**B1**	
			read off against screen values	**B1**	**4**
	(b)	**(i)**	6.1 (cm) (accept 6 or any value in range 6.0 to 6.2)	**A1**	
		(ii)	50 ms for 10 cm or 5 ms per cm e.c.f.	**C1**	
			so 6.1 x 5 ms or 31 ms	**A1**	
		(iii)	difference in time of runners finishing race or other timing between two closely separated events.	**B1**	**4**
					[8]

10	**(a)**	current = power/voltage or 150/12	**C1**	
		value is 12.5 A	**A1**	
	(b) **(i)**	sum of currents at junction = current after junction/12.5 A = 5.0 A + I	**C1**	
		value is 7.5 A	**A1**	
	(ii)	power = VI or is 7.5 x 12 e.c.f from **(i)**	**C1**	
		value is 90 W	**A1**	
	(iii)	resistance = voltage/current or 12/7.5 e.c.f. from **(i)** but not from **(a)**	**C1**	
		value is 1.6Ω	**A1**	**6**
				[8]
11	**(a)**	top line correct, need 24 and 0	**B1**	
		bottom line correct, need 12 and –1 (accept β or e for electron	**B1**	**2**
	(b)	particles take curved path (accept from diagram)	**B1**	
		move between the poles at right angles to lines of force	**B1**	
		move out of paper	**B1**	**3**
	(c) **(i)**	use detector to pick up <u>radiation</u> (from isotope at points on/in body etc.)	**B1**	
		high count where circulation good or v.v. explained	**B1**	
	(ii)	alpha particles all absorbed, none detected		
		beta particles may be largely absorbed, not penetrative enough		
		gamma rays reach detector/leave body any two	**B2**	**4**
				[9]
				TOTAL 80

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 60

SYLLABUS/COMPONENT: 0625/05

PHYSICS
Practical

1	**(b)(c)**	Table A, 6 temps, decreasing	
		Table B, 6 temps, decreasing	1
		Temp unit	1
		Time unit	1
		Evidence of temp to better than 1°C	1
		Consistently better than 1°C	1
	(d)	Graph:	
		Time axis suitable (no '3' scales allowed)	1
		Time axis labeled	1
		Check plots at 210 s and 240 s	1
			1
		lines judgement (best fit curves)	1
		lines thickness	1
		Both lines correctly labeled	1
	(e)	Conclusion:	
		Correct statement in relation to candidate's lines	1
		Explained with correct reference to gradients (if previous mark scored)	1
			TOTAL 15
2	**(b)**	x = 20.0 (cm)	1
	(c)	y value less than 25 cm	1
		y value to nearest mm	1
	(d)	d = 25 (cm) (allow e.c.f.)	1
	(e)	t value correct arith	1
	(f)	x = 30 (cm)	1
		y value in range 30.0 – 37.5 (cm)	1
		d = 37.5 (cm) (allow e.c.f.)	1
		all x, y, d consistently in mm, cm or m (unit stated at least once)	1
		x, y d units stated every time	1
		t value correct arith	1
		t values within 0.5 cm of each other	1
	(g)	average t; correct method	1
		final answer to 2/3 sf	1
		with correct unit	1
			TOTAL 15

3		Trace	
		Neat thin lines	1
		Lines complete	1
		A and B correct positions	1
		New B correct	1
		i = r (by eye)	1
		CD at least 5 cm	1
		Second CD at least 5 cm	1
		Straight lines extended to X	1
		XA drawn and Y labeled	1
	(j)	AY correct to 2 mm	1
		YX correct to 2 mm	1
		AY and YX same to within 10 mm	1
	(k)	Thickness of mirror OR thickness of pins OR thickness of lines	1
	(l)	Precaution (pin separation, view bases, vertical pins)	1
		Reason	1
			TOTAL 15
4.	**(b)–(g)**	x in m, cm or mm	1
		V in V	1
		k in V/m, V/cm or V/mm	1
		correct x values (0.200, 0.400, 0.800 m)	1
		all x to nearest mm	1
		x consistent sf	1
		evidence of V to better than 0.5 V	1
		all V to better than 0.5 V	1
		3 k values	1
		Check second k value, correct	1
		all k to 2 sf OR all k to 3 sf	1
		all k same to within 10%	1
	(h)	(voltage increases with length)	1
		OR voltage proportional to length	2
		k = constant OR figures correctly quoted	1
			TOTAL 15

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 0625/06

PHYSICS
Alternative to Practical

1	**(a)**	wind string round more than once		
		divide measured length by number of turns to find c		
	(b) (i)	correct diagram, blocks parallel, one at each end		1
	(ii)	119 mm OR 11.9 cm to 121 mm OR 12.1 cm		1
	(c)	V = 32.39 to 32.41		1
		cm^3		1
	(d) (i)	V_m = 0.5 – 2 cm^3		1
	(ii)	correct calculation and 2/3 sf	(ignore unit)	1
				TOTAL 8
2	**(a) (i)(ii)**	2 neat continuous rays	(thickness up to as EF)	1
	(iii)	normal where incident ray meets mirror (90° by eye)		1
	(iv)	i = 20° ± 1° (allow e.c.f. if mark for normal not scored)		1
	(b) (i)(ii)	lines complete and neat with AX correctly intersecting		1
	(iii)	AY = 5.9 – 6.1 cm AND YX = 5.5 + 0.3 cm		1
	(c)	any one from:		
		thickness of mirror		
		thickness of lines		
		thickness of pins		
		judgement of where lines cross		1
				TOTAL 6
3	**(a)**	pointer at 0.35 A		1
	(b) (i)	variable resistor/rheostat/potentiometer		1
	(ii)	V		1
		A		1
		Ω		1
		One R correct		1
		All R correct	(6.129, 5.769, 4, correctly rounded)	1
		Consistent sf for R (either all 2 sf or all 3 sf)		1
	(iii)	variable resistor/number of cells		1
	(c)	Voltmeter in parallel with resistors (or power source)		1
		Ammeter next to X		1
		Symbols correct and all connections drawn in		1
				TOTAL 12

4	**(a)**	Scales: y-axis 1N = 4 cm; x-axis 1m/s2 = 4/5 cm right way round	
		Both axes labelled with quantity and unit	
		Plots to ½ sq (-1 each error or omission, minimum mark zero)	2
		Line thickness less than 1 mm and no 'blob' plots	1
		Well judged best fit single straight line	1
	(b)	Large triangle used (> ½ line) clear on graph	1
		Interpolation to ½ sq (if large enough triangle present)	1
		Value 1.38 – 1.48	1
		kg and 2/3 sf	1
			TOTAL 10
5	**(a)**	Two from:	
		same volume of water	
		same starting temperature of water	
		same size/shape/type beakers	
		same thickness/mass/volume of insulator	
		same room temp	2
	(b)	64°C (with unit)	1
	(c)	B	1
			TOTAL 4