CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2001

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 80

SYLLABUS/COMPONENT : 0625/03

PHYSICS
(EXTENDED)

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Types of mark used in this mark scheme

A Answer marks.
B Independent marks.
C Compensation marks.
M Essential method marks.

Notes on the system

1. Answer marks, type A, occur in calculations but may also be used for very precise statements. Answer marks are beyond doubt, the statement / value is either right, in which case the marks are scored, or wrong, in which case they are not scored.

2. Type A marks often have compensation marks, type C, associated with them. e.g. a calculation has 3 marks, C1, C1 and A1. If the correct answer is shown, all 3 marks are given. If the 2 C marks are scored, but the answer is wrong, only 2 marks are given. If 1 C mark only is scored then only 1 mark is given.

3. Sometimes the process of reaching the solution is so important that without it further credit is impossible to give. These are type M marks. They may be followed by A marks, which cannot be scored unless the M marks are scored. E.g. part of a question has 4 marks. These are M1, M1, A1, A1 so
   a) Neither M mark scored, zero scored.
   b) One M mark scored, maximum score 1 mark.
   c) Two M marks scored, no answer or wrong answer, maximum score 2 marks.
   d) Two M marks scored, correct answer (and unit if required), score 4 marks.

4. Type B marks are totally independent marks and present no problems.

QUESTION			SCHEME	TARGET GRADE	MARK
1	(a)	(i)	10 m/s	A1	
		(ii)	14 s	A1	
		(iii)	(distance is area under graph/ 14 x 10)		
			= 140 m	A1	3
	(b)		deceleration = change in speed / time		
			or		
			change in speed is 15 m/s in 8 s	C1	
			1.9 m/s^2	A1	2
	(c)	(i)	arrow clearly towards centre	B1	
		(ii)	causes circular motion / prevents it going in straight line	B1	
		(iii)	rails push on wheels / train or need force to produce acceleration	B1	3
					8
2	(a)	(i)	momentum = mass x velocity / 90 x 45	C1	
			=4050 kg m/s or Ns	A1	
		(ii)	average force = rate of change of momentum or force = ma		
			or = 4050/1.2 or 90 x 45 / 1.2	C1	
			= 3380 N	A1	4
	(b)		kinetic to heat (+ sound)	B1	1
	(c)		k.e. = 0.5 x m x v (C1) = 0.5 x 90 x 2025 (or 45 x 45) (C1)	C2	
			= 91 kJ	A1	3
					8
3	(a)		ruler on pivot with one mass hanger on each side of the pivot	B1	
			ruler, pivot and masses labels	B1	2
	(b)		any indication that masses and lengths from pivot measured	B1	
			any indication of adjustment to achieve balance	B1	2
	(c)		e.g. 100g at 20 cm balances 50g at 40 cm, two examples	B2	
			one calculation e.g. 100 x 20 = 50 x 40	A1	3
					7

4	**(a)**		(fast-moving) gas molecules hit M or it or each other (not air molecules)	B1	
			change of direction as a result of collisions stated or implied	B1	2
	(b)		motion is random, expressed in various ways	B1	
			movement keeps “doubling back” so forward progress is slow	B1	2
					4
5	**(a)**		energy needed for 1g through 10 degrees = 10500/250 or energy needed for 1g through 100 degrees =10500/25	C1	
			= 420J	A1	
			energy needed to convert 1g of water = 33900/15	C1	
			= 2260J	A1	
			difference = 1840J (no credit for subtraction of wrong values)	A1	5
	(b)		energy needed to separate the liquid molecules	B1	
			because there are forces holding the molecules together	B1	2
	(c)	**(i)**	sensitivity, change in length / volume per degree or similar	B1	
		(ii)	range, lowest (temperature measured) to highest (large) or similar	B1	
		(iii)	linear scale, same distance between all degree intervals or similar	B1	3
			NB **5(a)** and **5(b)** are on the next sheet		
					10
6	**(a)**		names, refraction and diffraction	B2	
			wavelength change, (smaller) and same/no change	B1	
			frequency, same and same	B1	4
	(b)	**(i)**	each correct ray (two) through lens one mark	M2	
			rays produced back to image	A1	
			(if this not correctly done, forming virtual image, next mark cannot be scored)		
			times bigger = 2	A1	
		(ii)	1 eye position suitable to view virtual image	B1	
			2 magnifying glass or eyepiece	B1	6
					10

7	**(a)**		A and B joined by (straight) line, must all be above centre line	B1	
			exterior loop A to B	B1	
			arrow (internal), A to B and arrow (external), B to A or one or more correct arrows on loop (none wrong)	B1	3
	(b)	**(i)**	circle through C	B1	
			arrow anticlockwise	B1	
		(ii)	lines cannot touch or cross or alternative	B1	
		(iii)	1 strength same, direction opposite	B1	
			2 stronger field, same direction	B1	5
					8
8	**(a)**		any use of W = V x I	C1	
			X = 2.5 A; Y = 1.25 A	A1	
			Z = 3.75 A (allow e.c.f. from X and Y)	A1	M2
	(b)		attempt to use parallel resistance formula or Ohm's law on full circuit	C1	
			resistance = 64 ohm	A2	3
	(c)	**(i)**	total resistance = 288 ohm	C1	
			current = 0.83 A	A1	
		(ii)	A, 80V; B, 160V	A2	M3
	(d)	**(i)**	any point e.g. lamps require 240V or voltage divided in series	B1	
			one reference to values worked out by candidate	B1	
		(ii)	parallel circuit (M1) switch in each line affects only 1 lamp etc (A1)	2	4
					12
9	**(a)**		connections correct	B1	1
	(b)		3.5 squares	C1	
			1.4 V	A1	2
	(c)		any sensible attempt e.g. takes less current/shows any variations in value	B1	1
					4

10	**(a)**		24 and 12 on magnesium	A1	
			0 and -1 on e	A1	2
	(b)	**(i)**	curve to +ve	B1	
		(ii)	electron charge negative	B1	
			negative attracted to +ve, etc	B1	3
	(c)	**(i)**	apparatus shown, beta source, detector / counter, paper in between	B1	
			items above labelled	B1	
		(ii)	read detector, move paper and read again or use second sheet of paper	B1	4
			any change in reading means change in thickness	B1	
					9