UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0625 PHYSICS

0625/32 Paper 32 (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 May/June 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

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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 a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored. NOTE: M marks in questions 4 and 11.

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.

Second variant Mark Scheme

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1 **(a)** straight line through origin and reaching (or would reach) 30m/s after 3s B1

(b) average speed × time or area under graph or $s = ut + \frac{1}{2}at^2$ or $\frac{1}{2}b \times h$ C1
20 m c.a.o. A1

(c) line, all below first line and horizontal at 14m/s (±½ small square) B1
NOTE: "knee" of line need not be curved

(d) **(i)** any intelligent attempt
e.g. effect of air resistance, B larger area than A, B smaller mass/weight than A B1

(ii) (eventually) upward force on B = downward force or equivalent. B1
no more acceleration or constant speed NOT terminal velocity B1

(e) **(i)** 2.0 N or 2 N B1

(ii) 0.2 kg or 200 g B1

(f) 2 N or 2.0 N or candidate's **(e)(i)** B1

[10]

2 **(a)** fusion (of nuclei) CARE: NOT fission or fision ACCEPT fussion B1
condone radiation as an extra

(b)

radiant/heat energy from Sun or radiation from Sun	)	
energy from Sun raises temperature of water/heats water/melts ice	)	
energy from Sun evaporates water	) any 3	B1 × 3
PE in cloud	)	
rain	)	
stored water has PE	)	

(c) **(i)** 25/100 for gas-fired or 30/90 for hydroelectric
or energy out/energy in or power out/power in B1

(ii) 30/90 or 1/3 or 33% is more than 25/100 or ¼ or 25%
OR lower input into hydroelectric station, but more output than gas-fired station B1
IGNORE hydroelectric losses less than gas-fired losses

[6]

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3 **(a)** mgh or 90 × 10 × 14 accept 9.8 or 9.81 instead of 10 — C1
12 600 J or 12348 J or 12360.6 J nothing else — A1

(b) PE lost = KE gained or mgh = ½mv^2 — C1
(v^2 =) 280 e.c.f. or 274.4 or 274.68 — C1
16.7 m/s e.c.f. or 16.565 m/s or 16.573 m/s NOTE: 16.8 m/s gets A0 — A1

(c) energy lost or friction/air resistance/drag/wind resistance — B1

[6]

4 **(a)** pV = const in any form, words or recognisable symbols — B1
NOT p proportional to 1/V, NOT p =1/V, any mention of T gets B0

(b) p × V is the same each time OR when p is doubled, V is (always) halved — M1
so if gas obeys the law, the temperature must have been constant — A1

(c) $p_1V_1 = p_2V_2$ — C1
1.2 (× 10^5) × 75 (× A) = 3.0 (× 10^5) × l (× A) — C1
l = 30 mm — C1
distance moved = 45 mm e.c.f. — A1

[7]

5 **(a)** SOLID higher temperature means higher energy/greater speed of mols/particles/atoms — B1
NOT more vibration NOT vibrate more

vibrations get bigger or movement greater/take up more space or separation larger — B1
GAS (ave) speed/energy of mols/particles/atoms greater — B1
(ave) separation of mols/particles/atoms greater or mols/particles/atoms take up more space or increased pressure causes container to get bigger — B1

(b) liquids: slightly more — B1
gases: much more — B1

(c) regular/uniform expansion or appropriate range (be generous if numbers quoted) or expands a lot/large expansivity or (relatively) non-toxic or low freezing point/melting point or measures low temperatures — any 1 — B1
IGNORE reacts to small temp change IGNORE high boiling point

[7]

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6 **(a)** two correct rays ±1 mm on axis ignore any arrows B1
I drawn between candidate's intersection and axis B1

(b) **(i)** (becomes) larger B1
further from lens B1

(ii) (becomes) virtual)
(becomes) (even) larger) any 2 B1 + B1
(becomes) upright)
situated to right of lens (IGNORE further away))

[6]

7 **(a)** (condone discontinuities at boundaries)

mirror:
equally spaced reflected waves, approx. same spacing as incident (by eye) B1
IGNORE reflected waves to left of arrowhead
correct angle to surface, by eye B1

block:
reduced wavelength in block B1
ACCEPT refracted waves to left of arrowhead
at sensible angle of refraction B1
CONDONE reflected waves shown as well as refracted

(b) **(i)** 3×10^8/speed in glass = 1.5 C1
2×10^8 m/s A1

(ii) sin70°/sin*r* = 1.5 C1
38.7895° to 2 or more sig figs A1

[8]

8 **(a)** all 4 lights in parallel with supply and none in series B1
master switch in a place where it will work (cannot score if no supply or if short circuit) B1

one switch for 2 lights in living room AND one for bathroom
AND one for bedroom B1

(b) **(i)** W = V × I or 100 = 200 × I in any form C1
0.5 A or 0.5 a A1

(ii) I × t or 0.5 × 60 e.c.f. C1
30 C or 30 c e.c.f. A1

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(c) (i) 135 W B1

(ii) any power × any time (words or symbols or numbers) C1
NOTE: 280 (W) is the total power of lamps in house, so counts as "power"

486 000 J or 486 kJ or 0.135 kWh accept lower case units A1
NOTE: 45 × 3600 = 162000 J gets e.c.f. from **(i)**

[10]

9 (a) 3 complete circles about thick wire, roughly concentric on wire B1
clockwise or anticlockwise arrows on any 2 correct circles, and no contradictions B1

(b) (i) reduced B1

(ii) same OR none B1

(c) (i) thin wire is a current-carrying conductor in a magnetic field B1
field produced by current in thick wire B1
OR alternative approach:
(both wires produce a magnetic field B1)
(fields interact B1)

(ii) inwards/towards thick wire/to right/towards T_1T_2 B1

(iii) smaller force B1

[8]

10 (a) correct symbol, must show 3 connections, condone rounded "nose", ignore width of the shape, allow OR gate followed by NOT gate, correctly drawn B1

(b) if truth table is shown, mark the truth table and ignore the rest
either input 1, output 0 **AND** both inputs 1, output 0 B1
both inputs 0, output 1 accept high/low, on/off for both B1

(c) (i) one input is high/1 AND output is low/0 B1
IGNORE any reference to 2nd input

(ii) 1. on B1
2. off B1

[6]

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11 **(a)** number of protons 17 and 17 B1
number of neutrons 18 and 20 B1
number of electrons 17 and 17 B1

(b) alpha, beta, gamma words or symbols, any order NOT gamma particles B1

(c) (mark **(i)** and **(ii)** together)

(i) any correct use M1

(ii) simple correct explanation A1

[6]