UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0625 PHYSICS

0625/02 Paper 2 (Core 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.

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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.
NOTE: In this paper, note the M marks in Questions 1, 3 and 12.

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.

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.

1 (a) (i) 9.2 ± 0.2 (cm) [B1]

(ii) Centre of mass at centre of rod anywhere between a line vertically above the 'i' and the and a line vertically above the left hand '1' in 'Fig. 1.1', anywhere across diameter including the surface but NOT outside the surface [B1]

(b) Centre of mass clearly to left of centre, inside the rod [M1]

anywhere between a line vertically above the 't' in 'to' and a line vertically above the 't' in the first 'the' AND on axis (by eye) [A1]

[Total: 4]

2 (a) (i) suitable scale, probably 5 small squares = 10 s, no awkward ratios [B1]

(ii) (if no scale written on graph, assume our scale)
straight line from origin [B1]
reaching 25 m/s after 10 s NOT horizontal from (0,25) – (10,25) [B1]
horizontal from 10 – 50 s [B1]
straight line down from end of his horizontal line [B1]
reaching axis at 70 s [B1]

(b) average speed = total distance/total time [C1]
1375/his 70 [C1]
19.64… e.c.f. any number of sig. figs [C1]
20 (m/s) e.c.f. [A1]

[Total: 10]

3 (a) clockwise: F_3 [B1]

anticlockwise: F_1 [B1]
F_2 [B1]

(b) *c* [M1]
clockwise moment (accept moment on RH side) was too big [A1]
reduce moment by reducing distance [A1]
note: moment must be mentioned in both of the last 2 marks; accept turning effect, torque and leverage as alternatives to moment

(c) any value bigger than 29 g and less than 30 g, but NOT 29 g or 30 g [B1]

[Total: 7]

4 **(a)** **(i)** P.E. (however expressed)
(e.g. GPE, gravitational, gravity, potential, positional) [B1]

(ii) chemical [B1]

(b) electrician AND because he is heavier/greater force/greater weight/greater gravity force/ greater mass [B1]

(c) time AND either work done OR energy used OR equivalent
OR weight AND velocity/speed [B1]

[Total: 4]

5 **(a)** nucleus OR nuclei OR α-particle NOT nucleon or nuclide [B1]

(b) electron(s) OR e allow β-particle [B1]

(c) neutron(s) OR n [B1]
proton(s) OR p [B1]

(d) alpha OR α NOT a or A [B1]

(e) electron(s) OR e allow β-particles [B1]

[Total: 6]

6 (condone rays not drawn with a ruler, if reasonably straight)

(a) straight ray through centre of lens (±1 mm on axis by eye) (ignore any arrows) [B1]

(b) **(i)** ray correct, either through pole or
reasonably parallel to axis and then through F_1 (±1 mm in either case)
NOTE: any refraction must be at centre line or at <u>both</u> surfaces [B1]

(ii) (condone image not labelled if it is clear where it is; condone image labelled as 'object' if image line clearly drawn)
image located at his intersection, even if intersection of incorrect rays [C1]
image drawn between axis and his intersection, and not beyond either [A1]

(c) clear indication of screen at candidate's image, using vertical line [B1]

[Total: 5]

7 **(a)** gas)
solid) any 1 correct [B1]
liquid) remaining 2 both correct [B1]

i.e. gas, solid, liquid: 2 marks gas, liquid, solid: 1 mark liquid, solid, gas: 1 mark
liquid, gas, solid: 0 marks solid, liquid, gas: 0 marks solid, gas, liquid: 1 mark

(b) **(i)** liquid [B1]

(ii) idea that molecules/particles gain energy OR move faster (condone 'vibrating') [B1]
idea of molecules/particles becoming gaseous/breaking free [B1]

(iii) boiling, at one temperature only AND evaporation at any temperature [B1]
boiling throughout liquid AND evaporation at surface only [B1]

(c) **(i)** solid [B1]

(ii) 660 (°C) allow 659 (°C) NOT –660 (°C) [B1]

[Total: 9]

8 **(a)** **(i)** 1 ice point OR freezing point <u>of water</u> OR melting point <u>of ice</u> NOT just 'freezing point' [B1]
2 ice OR freezing water [B1]
pure or melting or ice-water mix [B1]
3 0 (°C) OR 273 <u>K</u> OR 273 <u>°K</u> [B1]

(ii) 1 steam point OR boiling point of water
NOT just 'boiling point' [B1]
2 steam [B1]
boiling (water) OR standard pressure [B1]
3 100 (°C) OR 373 <u>K</u> OR 373 <u>°K</u> [B1]
°C OR K OR °K used in either of the parts 3 [B1]

(b) thermal capacity OR heat capacity, allow specific heat capacity [B1]

[Total: 10]

9 **(a)** correct symbol [B1]

(b) **D A C B** all 4 in correct order (allow B1 for any 2 in correct place) [B2]

(c) (note: mark 1 and 2 together) (1 mark max from any one line below)
too great a current might flow)
fuse might not melt NOT fuse won't work) any 2 [B1,B1]
fuse won't protect OR appliance might be damaged)
wiring might overheat/melt or equivalent)
fire might be caused)
NOT circuit broken, NOT short circuit, NOT electric shock

[Total: 5]

10 **(a)** $R_1 + R_2$ in symbols or figures [C1]
60 (Ω) [A1]

(b) voltmeter correctly shown between X and Y (or equivalent), must be correct symbol [B1]

(c) **(i)** I = V/R [C1]
1.5/60 e.c.f from **(a)** [C1]
0.025 [A1]
A OR a OR amp(s) OR ampere(s) OR mA etc. [B1]

(ii) 1.5 (V) [B1]

(d) **(i)** decreases [B1]

(ii) decreases [B1]

(iii) 60 (Ω) e.c.f from **(a)** [B1]

[Total: 11]

11 **(a)** **(i)** no current in circuit OR no voltage in circuit [B1]
e.m.f. induced in AB is cancelled by e.m.f. induced in BC [B1]

(ii) idea of straightening out ABC OR rotate ABC (on its axis)
OR connect G across AB or CB [B1]

(b) any valid answer
e.g. transformer, induction coil, generator, dynamo, microphone, alternator, computer
NOT motor, relay
(use right + wrong = 0 for incorrect extras) [B1]

[Total: 4]

12 (a) anything less than, or equal to, 30 min [C1]
between 22 and 27 min, inclusive [A1]

(b) (i) iodine(-128) OR the second one [B1]

(ii) <u>radon-220</u> OR the first one [M1]
NOTE: NOT radon-222
NOT just radon, unless mention of 55 s in 'why' section

shortest half-life OR decays most rapidly OR takes least time to decay
NOT 'because it only has a half-life of 55 s' [A1]

[Total: 5]