UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2009 question paper

for the guidance of teachers

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, which would have considered the acceptability of alternative answers.

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.

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."

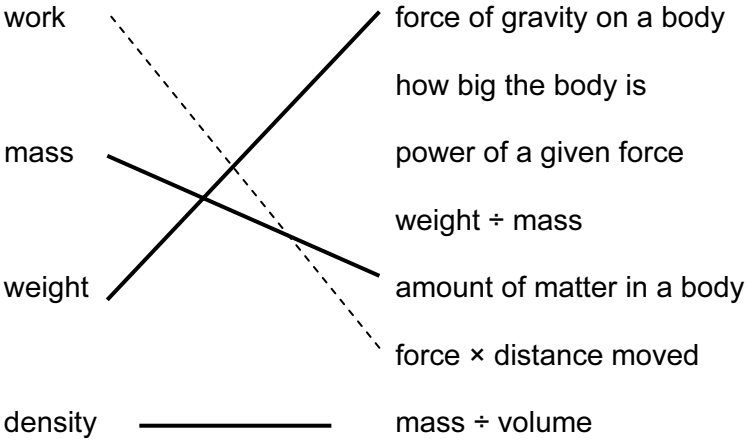
e.e.o.o. means "each error or omission".

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.

1 **(a)** 35 B1

(b) vehicles/time in any form, letters words or numbers C1
700/35 e.c.f. **(a)** C1
20 e.c.f. **(a)** A1 [4]

2



B1×3 [3]

3 **(a)** 1500 B1

(b) second box ticked (use ✓ + × = 0 for extras) B1

(c) constant speed B1

(d) award B1 from each of any 2 lines:

<u>increased</u> wind/air resistance OR headwind OR roof rack)
rough(er) ground OR flat tyre OR <u>increased</u> road resistance/friction) B1 + B1
brakes applied)

IGNORE increased speed/changed car shape/increased load
IGNORE driver decided to stop [5]

4 **(a)** 88 – 92 B1

(b) his **(a)** B1

(c) 840 e.c.f. **(b)** B1

(d) left level up <u>and</u> right level down B1
L at 80 <u>and</u> R at 150 B1 [5]

5 **(a)** **(i)** rapid/rapid heat transfer/gain OR rapid reading/response
NOT sensitivity/temperature transfer — B1

(ii) strength OR reduce chance of breaking OR to magnify the thread
ignore any mention of safety — B1

(iii) sensitivity or equiv. (e.g. idea of large movement of thread) — B1

(b) mercury OR alcohol — B1

(c) 0 and 100 — B1
°C on at least 1 temperature — B1 [6]

6 **(a)** **(i)** decreasing OR getting lower/quieter/softer — M1

(ii) amplitude/length of wave decreased OR waves got smaller
NOT wavelength decreased — A1

(b) **(i)** nothing OR constant — M1

(ii) waves equally spaced OR wavelength/period/T constant — A1

(c) **(i)** 12 – 14 — B1

(ii) 1. 300 (waves, oscillations, vibrations) every second — B1
2. 1/300 (s) OR 0.0033 OR 0.003 with indication of recurring 3 — B1
3. 1/his300 × his 12 OR his (1/300) — C1
0.04 (s) e.c.f. — A1

(d) **(i)** yes/✓))

(ii) yes/✓)) –1 e.e.o.o. — B2

(iii) no/✓) [11]

7 **(a)** **(i)** 1. normal correct, by eye — B1
2. *i* correctly labelled — B1

(ii) *i* = *r* in any recognisable form accept incidence = refraction
NOT sin *i* = sin *r* B0 for refraction, refrection, reflaction — B1

(iii) V — B1

(iv) none — B1

(b) be reasonably generous:
correct inversion — M1
stem approx. parallel to card edge — A1 [7]

8 **(a)** **(i)** iron (rod) — B1

(ii) plastic (rod) — B1

(b) S S N — B1

(c) – somewhere on or near rod D, near end C
condone extra + or – signs unless contradict — B1

(d) one needle pointing N, by eye — C1
both needles pointing N, by eye — A1 [6]

9 Apply max 1 un. pen. in **(a)** and **(b)** together. Apply at first instance of unit penalty.

(a) (i) 6 V B1

(ii) 50 mA OR 0.05 A B1

(b) $R = V/I$ in any form, letters, words, numbers OR V/I C1
6/50 OR 6/0.05 e.c.f. **(a)** OR 0.12 Ω (0.12 Ω gets 2, 0.12 gets 1) C1
120 Ω c.a.o. accept V/A instead of Ω A1

(c) (i) increase resistance/ohms OR add another resistor
OR decrease e.m.f./voltage/p.d. C1
double resistance/ohms OR add another R (in series)
OR halve e.m.f./voltage/p.d. OR use 3 V cell/battery
OR remove one cell/battery OR use only 1 cell/battery A1

(ii) idea of breaking the circuit OR removing battery
OR make voltage zero OR switch off B1

(d) (i) infinite OR very large (if figure quoted, must be ⩾25 A)
NOT just "higher" B1

(ii) idea of damage but NOT "blows up" C1
ammeter – coil burnt out OR pointer bent)
battery – overheats OR runs flat quickly) any 1 A1
circuit – overheat/burn out/insulation melts)
NOT it trips out [11]

10 (a) XY would move up/anticlockwise/motion reversed/pan moves down B1

(b) (i) 1. sensible choice of F scale) B1
) both lost if scales reversed
sensible choice of I scale) B1
2. 4 points correctly plotted (± ½ small square) –1 e.e.o.o. B2
– B0 if ridiculous scale on either axis (e.g. non-linear, 3, 7, 9 etc.)
– can award both marks if scales interchanged but otherwise O.K.
– if any blob clearly >1 square diameter, then –1 for each (max 2)
3. reasonable straight line through his points, including 0,0 B1

(ii) 0.036 – 0.038 OR his correct value ± 0.0005 (B0 if ridiculous scale) B1

(c) (electric) motor OR ammeter OR galvanometer OR voltmeter
NOT generator/electronic balance B1 [8]

11 For **(a)**, **(b)** and **(c)**, mark the names, not the box

(a) CATHODE in bottom left box B1

(b) UP & DOWN in top middle box B1

(c) GLOWS in bottom right box B1

(d) battery shown connected across heater filament, any recognisable symbol
ignore extra wires if it would work B1

(e) electrons NOT beta particles NOT positive electron B1

(f) vacuum ticked (use ✓ + × = 0 for extras) B1 [6]

12

(1) electron(s) OR e (ignore any prefix or suffix)	<u>electromagnetic</u> radiation/waves/rays NOT just rays etc.	B1 + B1
~ 8000 units OR <u>very</u> large	zero/nothing NOT small/almost nothing NOT – (dash)	B1 + B1
negative allow – (dash)	no charge OR zero/neutral NOT negligible NOT – (dash)	B1 + B1
idea of <u>not very</u> (penetrating) OR stopped (but if a substance is mentioned, it must be appropriate, not air) NOT "not penetrating" NOT slowly penetrating	idea of <u>extremely</u> (penetrating) OR not stopped (but if a substance is mentioned, it must be appropriate) NOT very/strongly/highly penetrating NOT very fast penetrating	B1 + B1

[8]