UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0625 PHYSICS

0625/21 Paper 21 (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.

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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International Examinations

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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.

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.

Spelling Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit.

Significant figures Answers are acceptable to any number of significant figures ≥ 2, except if specified otherwise, or if only 1 sig.fig. is appropriate.

Units Ignore units, except where a mark is specified for a particular unit.

Fractions These are only acceptable where specified.

Extras Ignore extras in answers if they are irrelevant; if they contradict an otherwise correct response or are forbidden by mark scheme, use right + wrong = 0

Work which has been crossed out, but not replaced, should be marked as if it had not been crossed out.

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1 **(a)** distance — tape measure, trundle wheel, metre wheel OR laser measure NOT (metre) rule — B1, B1

time — stopwatch/clock IGNORE just watch/clock; IGNORE just chronometer — B1, B1

(b) speed = distance/time OR just distance/time — any arrangement, words or symbols; IGNORE magic triangles — B1

(c) **(i)** idea of acceleration/deceleration OR some distance at lower speed/lorry stops — B1

(ii) distance = speed × time — in this form only, words, letters or numbers — C1

66 × 20 OR 66 × ⅓ OR 66 × 20/60 — C1

22 (km) c.a.o. condone 0.33 used to give appropriate answer — A1

[9]

2 **(a)** 62.8 – 29.8 — C1

33.0 (cm) OR 33 (cm) — A1

(b) **(i)** 5.5 = constant × 33 — e.c.f. — C1

0.166 recurring e.c.f. ignore units; accept 1/6 or 0.16 or 0.166 or 0.167 or 0.17 or 0.2 NOT 0.20 — A1

(ii) N/cm OR N/m OR n/cm OR n/m seen in **(ii)** nothing else – mark independently of **(i)** — B1

[5]

3 **(a)** I = U + W accept words or mixture of words/symbols — B1

(b) **(i)** 850 (N) — B1

(ii) force needed to accelerate load/get it started OR if forces equal, then no movement — B1

(iii) height OR distance (use ✓ + × = 0 for extras) — B1

(iv) time (use ✓ + × = 0 for extras) — B1

(c) greater than OR > OR stronger accept "double" etc — B1

[6]

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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4 **(a)** **(i)** 1 nothing OR no change — B1
2 quieter/softer OR loudness less/decreases — B1

(ii) frequency control: none OR no adjustment **no e.c.f.** — B1
amplitude control: increase (amplitude) **no e.c.f.**
allow turn clockwise/to right — B1

(b) **(i)** echo OR reflection (of sound) OR bounced (back) — B1

(ii) idea of sound taking a finite time to travel
OR idea of sound doesn't travel infinitely fast
IGNORE sound has to travel to rock face and back — B1
[6]

5 **(a)** X marked anywhere, above or below, on vertical anywhere through rod — B1

(b) Y marked anywhere to right of X, but not beyond R.H. tip of parrot — B1

(c) idea of topples/falls/loses balance — C1
topples clockwise/to the right/to the front/forwards — A1
[4]

6 **(a)** **(i)** radiation
evaporation
convection
} any 2 — B1, B1

(ii) cardboard/it is a poor conductor/(good) insulator
air is trapped OR air is a poor conductor/(good) insulator
reduced surface in contact with fingers
} any 2 — B1, B1

(b) **(i)** heat/energy to raise/lower/change temperature of a body
OR heat/energy to heat up a body — B1
by 1 °C OR by 1K OR unit temp — B1

(ii) low thermal capacity — M1
less heat needed to raise temperature OR absorbs less heat — A1
[8]

7 **(a)** **(i)** idea of heat concentrated in a small space
OR lots of wire in small space
OR to get <u>required</u> resistance in a small place B1

(ii) radiation B1

(b) **(i)** **mark 1 and 2 together**
240 and 100 in correct order B1
V and W in correct order B1

(ii) I = V/R OR I = W/V in any form, symbols or numbers C1
240/576 OR 100/240 C1
0.416 recurring,
accept 0.4 or 0.416 or 0.417 or 0.41 or 0.42 NOT 0.40 C1
A OR a OR amp(s) OR ampere(s) <u>A1</u>
[8]

8 **(a)** 10 (cm) B1

(b) gets smaller NOT gets lower B1
gets closer to lens/moves to left/moves closer to F_1 B1

(c) **(i)** <u>principal</u> focus/foci OR focal/focus point(s)
NOT focal length NOT focus B1

(d) **(ii)** (ignore any arrows)

ray drawn from top of object, through F_2, to lens
must pass through the stroke indicating F_2 B1
single refraction clearly at centre line
OR two appropriate refractions at surfaces B1
travels parallel to axis after lens, by eye **must** be drawn with ruler B1
reaches top of image <u>B1</u>
[8]

9 **(a)** **(i)** water conducts/water lowers resistance B1
could get a shock (however expressed) B1

(ii) idea of cord insulating you from electricity OR cord not a conductor
OR idea of separates you from the electrics/live parts B1

(b) 10A ticked B1

(c) **(i)** large(r) current NOT more electricity B1

(ii) it/insulation/cable would overheat/melt OR cause fire
NOT blow up/damaged NOT fuse blows <u>B1</u>
[6]

10 **(a)** V_1/V_2 or N_1/N_2 or V_1/N_1 or V_2/N_2 in any form
substitution correct **and seen**
25 turns
} Allow full credit for use of 25 turns to give 12V, with working seen — C1 **M1** A1

Y and Z (either order) — B1

(b) 240 (V) — B1

(c) core — B1
iron NOT steel — B1

(d) good conductor OR low resistance OR to reduce heating
OR for high efficiency IGNORE good/bad conductor of heat — B1
[8]

11 **(a)** refraction OR slows down OR changes speed/wavelength OR bends
NOT reflaction or refrection — B1
dispersion OR divides/splits into colours/wavelengths/frequencies — B1

(b) **(i)** red
(ii) violet NOT blue NOT purple
} If red and violet interchanged, allow B1 only — B1 B1

(c) **(i)** X at or above top of visible spectrum — M1
middle of X clearly above top of visible spectrum but no more than twice height of the letter A from top of visible spectrum, by eye — A1

(ii) infra-red OR IR OR ir OR heat/thermal (radiation) — B1
[7]

12 **(a)** **(i)** beta, gamma –1 e.e.o.o. — B2

(ii) idea that radiation (from watch) can enter the body — B1

(b) **(i)** bottom left box ticked –1 e.e.o.o. — B1

(ii) locked cupboard OR lock (it)
OR storage in lead/suitable containers
IGNORE protective clothing/tongs etc — B1
[5]