CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0625 PHYSICS

0625/22 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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS

B marks — B marks are independent marks, which do not depend on other marks. For a B mark to be scored, the point to which it refers must be seen specifically in the candidate's answer.

M marks — 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 — C marks are compensatory marks in general applicable to numerical questions. These can be scored even if the point to which they refer are not written down by the candidate, **provided subsequent working gives evidence that they must have known it**. For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct substitution or working which shows he knew the equation, then the C mark is scored. A C mark is not awarded if a candidate makes two points which contradict each other. Points which are wrong but irrelevant are ignored.

A marks — 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. A marks are commonly awarded for final answers to numerical questions. If a final numerical answer, eligible for A marks, is correct, with the correct unit and an acceptable number of significant figures, all the marks for that question are normally awarded. It is very occasionally possible to arrive at a correct answer by an entirely wrong approach. In these rare circumstances, do not award the A mark, but award C marks on their merits. An A mark following an M mark is a dependent mark.

Brackets ( ) — 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.

<u>Underlining</u> — Underlining indicates that this **must** be seen in the answer offered, or something very similar.

OR / or — This indicates alternative answers, any one of which is satisfactory for scoring the marks.

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

o.w.t.t.e. — This means "or words to that effect".

Ignore — This indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.

Spelling — Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit. However, do not allow ambiguities, e.g. spelling which suggests confusion between reflection / refraction / diffraction or thermistor / transistor / transformer.

Not / NOT — This indicates that an incorrect answer is not to be disregarded, but cancels another otherwise correct alternative offered by the candidate, i.e. right plus wrong penalty applies.

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ecf meaning "error carried forward" is mainly applicable to numerical questions, but may in particular circumstances be applied in non-numerical questions. This indicates that if a candidate has made an earlier mistake and has carried an incorrect value forward to subsequent stages of working, marks indicated by ecf may be awarded, provided the subsequent working is correct, bearing in mind the earlier mistake. This prevents a candidate from being penalised more than once for a particular mistake, but **only** applies to marks annotated ecf.

Sig. figs. Answers are normally acceptable to any number of significant figures ≥ 2. Any exceptions to this general rule will be specified in the mark scheme.

Arithmetic errors

Deduct one mark if the **only** error in arriving at a final answer is clearly an arithmetic one. Regard a power-of-ten error as an arithmetic error.

Transcription errors

Deduct one mark if the only error in arriving at a final answer is because previously calculated data has clearly been misread but used correctly.

Fractions Allow fractions only where specified in the mark scheme.

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1 **(a)** last 2 boxes ticked B2

(b) **(i)** 267 (g) B1

(ii) LHS goes down **OR** RHS goes up B1

(iii) density = mass / volume, in any form e.g. words, symbols, numbers C1
267 / 30 C1
8.9 A1
g / cm^3 B1

[Total: 8]

2 **(a)** 2800 (N) B1

(b) **(i)** straight line B1
line slopes down M1
clearly indicated on axes 36 (m / s) and 18 (s) A1

(ii) area under graph **OR**
distance = (average) speed × time, in any form C1
½ × 36 × 18 C1
324 (m) A1

[Total: 7]

3 **(a)** any two from:
waves
wind
hydro(electric)
tidal
geothermal
solar
biofuel / biomass
wood B2

(b) any two from:
coal
oil **OR** any stated refined fuel
(natural) gas
nuclear B2

(c) **(i)** gravitational potential (energy) B1

(ii) water falls / drops **OR** GPE transferred to KE B1
spins / turns / moves turbine / generator B1

[Total: 7]

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4 **(a)** evaporation B1

(b) molecules escape (from the surface) M1
if they gain / have enough energy owtte A1

(c) more energetic / faster molecules escape B1
lower (average) energy (results in lower temperature)
OR energy flows from metal into water causing metal to cool B1

[Total: 6]

5 ✓ B1
✓ B1
x B1
✓ B1
x B1

[Total: 5]

6 **(a)** **(i)** ice M1
pure **OR** melting A1

(ii) boiling water **OR** steam M1

(b) solid B1

(c) any two from:
resistance of thermistor
pressure / volume / expansion of a gas
volume / length / expansion of a solid / metal
e.m.f. of a thermocouple
colour of a surface / liquid crystal
melting point of waxes
density of liquid (in Galileo thermometer) B2

[Total: 6]

7 **(a)** **(i)** <u>tape measure</u> **OR** <u>laser measure</u> **OR** <u>trundle wheel</u> B1

(ii) stopwatch / stopclock B1

(b) reaction time owtte **OR** delay in hearing sound B1

(c) **(i)** (speed =) distance ÷ time C1
100 ÷ 12.5 C1
8.0 (m / s) A1

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(ii) acceleration (at the start) or similar idea
OR indication of slowing down at the end (due to tiredness) B1

(d) (i) 200 m – 500 m B1

(ii) means of signalling when gun fired such as dropped arm or smoke seen B1

[Total: 9]

8 (a) (maximum) angle of incidence B1
for a ray to be just refracted / emerge **OR** resulting in an angle of refraction of 90° B1
beyond this angle the ray is totally internally reflected
OR ray travelling from (optically) dense medium to less dense medium B1

(b) ray at A: one emergent ray and one reflected ray B1
refracted away from normal B1
ray at B: one reflected ray only B1
angle of reflection is 50° by eye B1

[Total: 7]

9 (a) potential difference B1

(b) (i) $V_1 / V_2 = N_1 / N_2$ in any form C1
correct substitution C1
80 (V) A1

(ii) **1.** zero **OR** 0 (V) M1
2. idea of requirement of varying field / flux linkage A1

[Total: 6]

10 (a) volts **OR** V B1

(b) A and V in correct circles B1

(c) S **OR** symbol for variable resistor M1
variable resistor **OR** rheostat A1

(d) (i) points correctly plotted to ½ small square B1
good best-fit straight line through all points B1

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(ii) use of any V from table / graph **OR** large triangle drawn on graph C1
calculation using V / I **OR** gradient calculation C1
5.2 – 5.8 (Ω) A1

[Total: 9]

11 (a) background **OR** reasonable source of background B1

(b) 592 – 85 **OR** 507 seen **OR** used B1
507 / 3 **accept** 592 / 3 (i.e. background not deducted) C1
169 counts / min **accept** 197.3 counts / min (i.e. background not deducted) A1
Note: a candidate who does not deduct background but whose answer is otherwise correct will gain two marks.

(c) (i) 85 **OR** "approx. 85" B1

(ii) aluminium absorbs (β) radiation **OR** stops (β) radiation B1
only background count left **OR** reading goes back to value in **(a)** B1

[Total: 7]

12 (a) 5 B1

(b) (i) 9 B1

(ii) 4 B1

(c) electrons B1

[Total: 4]

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