CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 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.

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NOTES ABOUT MARK SCHEME SYMBOLS & 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. For example, 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.

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.

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”.

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.

AND — indicates that both answers are required to score the mark.

Spelling — Be generous with spelling and use of English. However, do not allow ambiguities e.g. spelling which suggests confusion between reflection/refraction/diffraction or thermistor/transistor/transformer.

Sig. figs. — On this paper, answers are generally acceptable to any number of significant figures ≥2, except where the mark scheme specifies otherwise or gives an answer to only 1 significant figure.

Units — On this paper, incorrect units are not penalised, except where specified. More commonly, marks are awarded for specific units.

Fractions — Fractions are only acceptable where specified.

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Extras — If a candidate gives more answers than required, irrelevant extras are ignored; for extras which contradict an otherwise correct response, or are forbidden by the mark scheme, use right plus wrong = 0.

Ignore — indicates that something which is not correct is disregarded and does not cause a right plus wrong penalty.

NOT — 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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1 **(a)** 0.38 and 0.66 seen
OR correct vertical lines/marks on axes ± ½ square C1

0.28 (s) A1

(b) speed is changing/increasing **OR** it is accelerating B1
OR accelerating at first (when curved line) then steady speed (when line is straight)

(because) graph is a curve **OR** gradient is changing B1
OR different distances travelled in equal time intervals
OR accept 'due to force of gravity'

[Total: 4]

2 **(a)** Any three from: max. B3
- string with mass on pin in front of card
- hang card on pin from a hole
- make sure card can swing freely
- (place plumb line on pin) and mark line/position on card
- repeat using at least one more hole
- where lines cross is centre of mass

(b) card will balance at that point B1
OR repeat using third hole
accept place pivot beneath centre of mass

[Total: 4]

3 **(a)** **(i)** 160(g) B1

(ii) (density =) mass÷volume, in any form C1

candidate's **(a)(i)** ÷ 200 C1

0.8 (g/cm^3) A1

(b) **(i)** conduction B1

(ii) warm(ed) liquid expands B1
NOT particles expand

density of warm(ed) liquid decreases B1
NOT particles become less dense

less dense liquid/warm liquid rises B1
NOT heat rises

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(c) (i) evaporation **OR** boiling B1

(ii) any one from: max. B1
- liquid molecules gain energy/move faster
- (the) most energetic molecules

ignore vibrates faster

molecules escape (from the liquid/into the air) B1

[Total: 11]

4 (a) weight **OR** gravitational attraction B1

(b) two forces are equal (in size) **OR** X and Y are equal (in size) B1

acting in opposite directions B1

accept forces are balanced **OR** no resultant force for BOTH marks

(c) arrow pointing to the right on Fig. 4.1 or Fig. 4.2 B1

(d) moves downwards/falls AND explanation e.g.
Y>X OR upwards force has decreased B1

[Total: 5]

5 (a) (i) upwards B1

(ii) shape B1

(b) (i) height of bounce decreases B1

(ii) heats/is transferred into the surroundings
OR (transferred) into thermal energy/heat/internal energy of surroundings B1

[Total: 4]

6 (a) B, D, C, A
all correct for 3 marks; 2 or 3 correct for 2 marks; 1 correct for 1 mark max. B3

(b) energy source that will not run out
OR source is not finite/is unlimited/is constantly replenished/can be replaced B1

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(c) (i) any two from**:** max. B2
- short start-up time
- lower running costs **OR** lower cost per unit **OR** no fuel costs
- can be controlled to meet peaks in demand **OR** predictable (supply)
- does not produce polluting gases **ACCEPT** is less polluting
- can be used as an energy store
- provides a recreational facility/ tourism

IGNORE vague answers such as 'environmentally friendly'

(ii) any one from: max. B1
- loss of habitat/environmental problems
- limited (suitable) sites (available)
- **ACCEPT** costly to build

[Total: 7]

7 (a) tractor tracks have larger area (in contact with ground)
OR reverse argument for car B1

pressure (on ground) mentioned
OR weight spread out (over larger area) **NOT** pressure is spread out B1

correct argument linking pressure and area B1

(b) (i) any value or range of values >0 and < 24 B1

(ii) any two from**:** max. B2
- (molecules) are slower/have less KE
- fewer impacts **OR** impact with less force
- (so) less force per unit area

[Total: 6]

8 (a) ray goes straight through 1st surface without changing direction B1
ray reflecting and **NOT** refracting at either inclined surface B1
ray reflected through 90° at either surface **OR** $i = r$ marked B1
emerging ray parallel to incident ray B1

(b) (i) X-rays B1
IGNORE answers in boxes

(ii) any two from**:** max. B2
- sensor detects warm things/heat/changes in temperature
- person is warmer/at different temperature (than surroundings)
- person emits (more) IR (than surroundings)

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(iii) any two from max. B2
- same speed (in vacuum, accept air)
- can travel in a vacuum
- transverse waves

IGNORE electromagnetic
NOT 2 obviously contradictory responses,
e.g. transverse AND longitudinal scores 0

[Total: 9]

9 **(a)** N and S labelled correctly, N on left, S on right B1

(b) Repels (a known) magnet/ attracts <u>unmagnetised</u> iron/steel B1

(c) steel B1
alternative materials such as Magnadur and Alnico accepted

(d) (Place inside) coil **OR** hammer it **OR** heat it B1

coil connected to a.c. (supply) **OR** hammer for long time
OR heat to high temperature then cool B1

(e) **(i)** electromagnet B1

(ii) (magnetic field/magnetism) can be controlled /can be switched off B1

(iii) suitable use e.g. crane for moving vehicles in scrap yards / relay / electric bells etc. B1

[Total: 8]

10 **(a)** **(i)** copper B1

(ii) $V_p/V_s = N_p/N_s$ in any form **OR** voltage ratio calculated C1

correct substitution e.g. 240/ 6 = 6000/ N_s C1

150 A1

(b) damp B1

[Total: 5]

11 **(a)** <u>ionising</u> radiation **OR** radioactive emissions **OR** radioactivity B1

from surroundings **OR** that is always present B1

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(b) GM tube **OR** Geiger counter B1
accept radiation/film badge

(c) 86 B1

133 B1

86 B1

(d) (i) α B1

(ii) nucleus B1

(iii) electron: 0/zero/blank space
neutron: 2 B1
proton: 2 B1
note: no mark for electron, but max. 1 mark for question if electron has any non-zero number

[Total: 10]

12 (a) thermistor correctly identified (by letter T) B1

(b) (i) ammeter B1
NOT ampmeter

(ii) voltmeter B1

(c) (i) (R =) $V \div I$ in any form C1

3.2÷0.005 C1

640 (Ω) A1

(c) (ii) increases B1

[Total: 7]

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