MARK SCHEME for the May/June 2014 series

0625 PHYSICS

0625/21   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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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, 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".

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

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.

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 Incorrect units are not penalised, except where specified. More commonly, marks are allocated for specific units.

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.

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

Not/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.

1 (a) (speed =) distance / time in words, symbols or numbers   C1

(37.1 – 2.1 =) 35   C1

35 / 7   C1

5(.0) (cm / day)   A1

(b) (i) 3 points correctly plotted to ½ square   B2

(ii) (vertical) spacing not uniform / equal **OR** points not on a straight line
OR points do not line up **OR** difference in gradients between points   B1

[Total: 7]

2 (a) increase / change / difference in length **OR** new length – original length
OR amount / length / distance it stretches   B1

(b) (i) 1. 2 seen **OR** used   C1

11(.0)(cm)   A1

2. 0.8 (cm)   B1

(ii) $W = m \times g$ in words, symbols or numbers
OR correct conversion used, e.g. 1 kg = 10 N   C1

200 g / 0.2 kg   A1

[Total: 6]

3 (a) bright specks **OR** spots / dots **OR** flashes of light   B1

moving randomly **OR** jerky movements **OR** zig zag / jiggling   B1

(b) line representing a smoke particle moving with a change of direction   B1

line is straight with at least 2 changes of direction   B1

(c) collisions / bombardment   B1

(with) <u>air</u> atoms / molecules / particles   B1

**(d)** <u>Brownian</u>   B1

[Total: 7]

4 (a) greater pressure from man **OR** man will fall through ice **OR** ice will break / crack   B1

(b) idea of increasing area **OR** spreading load   M1

any three from: A3
larger (surface) area
load / weight / force more spread out
less pressure
use of $P = F/A$

[Total: 5]

5 (a) 74 (°C)   B1

(b) any three from: B3
particles move further apart / heating causes expansion
warm air less dense **OR** cold air more dense
hot air rises **OR** cold air falls
convection (current)

(c) moves / goes down (tube) **OR** gives a lower reading   B1

contracts / decreases in volume / shrinks   B1

(d) any indication between –10 °C and centre of bulb   B1

[Total: 7]

6 (a) (i) i and r both clearly correct   B1

(ii) $i = r$ B1

(iii) seeing over / around an obstacle   B1

(iv) image / ray moves / misses eye **OR** viewer can no longer see image / ray / anything **OR** viewer sees inside of tube **OR** angle of incidence / reflection changes   B1

(b) (i) <u>2</u> focal lengths indicated   B1

(ii) ray parallel to axis **AND** emergent ray goes <u>through</u> F1   B1

refraction shown at centre line **OR** at each surface   B1

(iii) incident ray <u>through</u> principal focus **AND** emergent ray parallel to axis   B1

[Total: 8]

7 (a) (milli)ammeter **OR** galvanometer **NOT** ampmeter   B1

   (b) (i) nothing / stays the same / half-way   B1

      (ii) nothing / stays the same / half-way   B1

      (iii) nothing / stays the same / half-way   B1

      (iv) it / arrow / pointer moves / goes / flicks **OR** current changes   M1

           left and right **OR** backwards and forwards   A1

   (c) generator **OR** dynamo **OR** microphone   B1

                                         [Total: 7]

8 (a) (i) nothing / zero / 0   B1

      (ii) $V = IR$ or V/R in words, symbols or numbers   C1

           6 / 10   C1

           0.6   A1

           A **OR** amp(s) **OR** ampere(s)   B1

      (iii) candidate's **(a)(ii)**   B1

   (b) (i) <u>variable</u> resistor **OR** rheostat

           OR potential divider   B1

      (ii) neat, correct circuit with one added component in series with lamp   B1

           correct symbol for <u>variable</u> resistor   B1
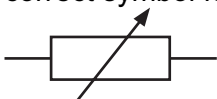
                                         [Total: 9]

9 (a) idea of points to north (pole of Earth)   M1

    when freely suspended / floating on water   A1

    OR

    repels   (M1)

    a (known) N pole   (A1)

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(b) (i) repulsive / repel   B1

   (ii) repulsive / repel   B1

  (iii) attractive / attract   B1

(c) (i) | S   N | B1

   (ii) attractive / attract   B1

  (iii) attractive / attract   B1

[Total: 8]

10 (a) iron   B1

(b) $V_1 / V_2 = N_1 / N_2$ in words, symbols or numbers   C1

  correct substitution   C1

  12 (V)   A1

[Total: 4]

11 (a) alpha **OR** α B2
beta **OR** β
gamma **OR** γ

  in any order
  if two correct, 1 mark

(b) (i) beta **OR** β B1

   (ii) alpha **OR** α B1

  (iii) alpha **OR** α B1

(c) (i) 2   B1

   (ii) evidence of number of atoms halved twice   B1

      6×10^{10} B1

  (iii) candidate's **(c)(ii)**   B1

[Total: 9]

12 (a) 17   B1

(b) 20   B1

(c) 17   B1

[Total: 3]