MARK SCHEME for the October/November 2013 series

0625 PHYSICS

0625/23	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 October/November 2013 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 significant figure 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)** 2.4 and 15.6 used   C1
       13.2 (cm)   A1

   (b) R.H. end at {candidate's **(a)** + 1.0 (cm)}   B1

   (c) 4.4 (cm)   OR   candidate's **(a)** / 3 correctly evaluated   C1
       division by 4   C1
       1.1 (cm) e.c.f.   A1

                                                                  [Total: 6]

2 **(a)** **(i)** chemical   B1

      (ii) GPE / gravitational potential energy (allow gravitational / potential / thermal)   B1

   (b) all stated quantities are appropriate for calculating power, expect weight/mass and height
       and time
       −1 for each error or omission (minimum zero)   B2

   (c) athlete/he/she is heavier o.w.t.e.   B1

                                                                  [Total: 5]

3 **(a)** **(i)** any statement that indicates that sound travels slower than light   B1
          ("sound travels slowly", on its own, gets zero)

      (ii) speed = distance/time   in any form   C1
          1700/5   C1
          340   A1
          m/s   B1

   (b) **(i)** 2nd box ticked / before the girl   B1

      (ii) bottom box ticked / louder   B1

                                                                    [Total: 7]

4 (a) thermometer   B1

(b) temperature   B1

(c) mercury / Hg / alcohol   B1

(d) put it in ice   M1
   melting   A1

(e) liquid/Hg/alcohol expands/moves along tube/gets hotter   B1

[Total: 6]

5 (a) (i) cross same distance from mirror,   B1
   line joining cross and object would be perpendicular to mirror,   B1

   (ii) reflected ray going down to left   B1

   EITHER   line of reflected ray, goes through candidate's dot

   OR   angles of incidence and reflection are equal, by eye   B1

   (iii) normal shown correctly drawn,   B1
   i and *r* correctly marked   B1

(b) same size
   behind mirror
   same distance from mirror
   virtual   any 2   B1+B1
   same height above ground, o.w.t.t.e.
   upright
   allow idea of side to side swap / laterally inverted

(c) light reflected at each surface / both sides   B1

[Total: 9]

6 **(a)** **(i)** further apart at bottom / 2nd box ticked   M1

    (ii) like charges <u>repel</u> / positive charges <u>repel</u> other positive charges   A1

  (b) **(i)** closer together at bottom / bottom box ticked   M1

    (ii) unlike/opposite/different charges/ + and – / <u>attract</u>   A1

  (c) moves to L   OR   moves towards rod   OR   attracted by rod   B1
     moves to R   OR   moves away from rod   OR   repelled by rod   B1

                                                                     [Total: 6]

7 **(a)** conduction   B1

  (b) convection   B1

  (c) conduction   B1
     convection   B1

                                                                      [Total: 4]

8 **(a)** (radio)
     infra-red
     visible
     ultra-violet
     X-rays
     gamma   B2

     note: all 5 correct gains B2, any 3 consecutive in correct order, even if shifted in list,
     gains B1

  (b) between radio and infra-red   B1

  (c) idea that microwaves can be hazardous   B1

  (d) communications
     GPS/satellite navigation
     satellite TV   any 1   B1
     mobile/cell phones

                                                                     [Total: 5]

9 **(a)** **(i)** 0.3 (A)   B1

     (ii) 0.3 (A)   B1

  (b) $R = V/I$ in any form   OR IR C1
      0.3 × 10   C1
      3 (V)   OR   3.0 (V)   A1

  (c) **(i)** variable resistor / variable resistance / rheostat   B1

     (ii) zero   OR   0 (Ω)   OR   "nothing" stated   B1

     (iii) decreases   B1

                                                                      [Total: 8]

10 **(a)** **(i)** 4th box ticked   B1

     (ii) p.d. / 12 V / voltage is shared between two resistors   B1
           LDR more than half / greater share of 12 V   B1

  (b) **(i)** any 3 from:
          current in coil
          coil becomes electromagnet
          magnetic field (generated) around coil
          coil attracts / closes switch   B3

     (ii) lights up o.w.t.t.e.   B1

  (c) **(i)** in darkness   B1

     (ii) 1st box ticked   B1

                                                                       [Total: 9]

11 (a) (i) plastic absorbs alpha / alpha will not penetrate plastic / will not be detected   B1

     (ii) more particles reach detector when closer   B1

     (iii) idea of short half-life will cause inaccuracy over time or will need replacing   B1

   (b) (i) 88   B1

     (ii) 226 – 88 / i.e. candidate's **(b)(i)**   C1
        138 / e.c.f.   A1

     (iii) 226 – 222 = 4   OR   88 – 86 = 2   C1
        α-particle   A1

                                      [Total: 8]

12 (a) (i) iron   B1

     (ii) copper   B1

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

   (c) 3 lamps all in parallel, connected correctly to Fig. 12.1 output terminals   B1
      correct symbol for all 3 lamps   B1

                                        [Total: 7]