CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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International Examinations

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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. 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 <u>must</u> 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.

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

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 $\geqslant$ 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

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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.

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

1 **(a)** **(i)** 6 (km)   B1

   (ii) 8 minutes OR 8/60   C1
   0.13 (hours)   OR   2/15 (hours)   A1

   (iii) Speed = distance/time in any form   C1
   distance/time correctly calculated and rounded   C1
   answer in range 45.0 – 46.2 (km/hr)   NO e.c.f.   A1

   (b) straight line graph   B1

   (c) **(i)** 3 or 4   B1

   (ii) 1 (km)   B1
                                                                                                                [9]

2 **(a)** 8 or 8.0 (cm)   B1

   (b) 8 × 4 × 0.5   e.c.f. from (a)   C1
   16 (cm^3) e.c.f.   A1

   (c) **(i)** $D = M/V$ in any form OR $V × D$ OR   his volume × 1.2   C1
   19.2 (g)   e.c.f.   A1

   (ii) balance (accept spring balance)
   OR scale<u>s</u>   NOT scale   B1
                                                                                                                [6]

3 **(a)** less   B1

   (b) 123 (mm Hg)   B1

   (c) 752 + or – his 123   C1
   629 (mm Hg) c.a.o.   A1

   (d) same OR no change   B1
                                                                                                                [5]

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4 (a) X clearly beyond back of mirror   B1
      X correct vertical distance by eye   B1

(b) (i) normal between mid point of mirror and P correct by eye   B1

(ii) lines A′ and B′ drawn correctly to mirror so that i = r   M1
      either of top two boxes ticked   A1
                                        [5]

5 (a) (i) 0 (J)   B1

(ii) 150 (J)   B1

(b) any timer   B1
      start timing at A or B OR fiducial aid   B1
      stop timing when gets back to start/after complete oscillation   B1

      <u>stop</u>watch OR <u>stop</u>clock used   B1
      repeat and average   OR   time multiple swings   B1
                                        [7]

6 (a) (i) convection   B1

(ii) hot water expands/molecules further apart   B1
      NOT molecules expand
      hot water less dense NOT molecules less dense   B1
      hot water rises, accept hot molecules rise   B1
      cool water falls/takes place of hot water   B1

(b) hot air rises NOT heat rises   B1
                                        [6]

7 (a) left box infra-red   OR   IR   B1
      right box gamma   OR γ B1

(b) (i) red   B1

(ii) violet   B1

(c) (i) infra-red OR IR   B1

(ii) Any one from:
      photographing/seeing (broken) bones
      crystallography/crystal structure   B1
      any other sensible use

      NOT body scan

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(d) Any one from:
  same speed in a vacuum
  all transverse (waves)   B1
  all transfer energy

[7]

8 (a) (i) meter 2   B1

  (ii) ammeter   mark (a) and (b) together,

                                    any 2 correct B1
  (b) (i) meter 1   remaining 2 correct B1
                                                                                           B1
  (ii) voltmeter

  (c) (i) 1.6 (V)   B1

  (ii) $R = V/I$ in any form   OR V/I C1
        1.6/ 0.8   OR e.c.f. from (c) (i)/0.8   C1
        2 or 2.0   A1
        ohm(s)   OR   Ω   B1

  (iii) straight line through origin OR any V/I gives same value   B1

  (iv) greater slope   OR   bigger V needed for same I o.w.t.t.e.   B1

  (v) wire B <u>AND</u> larger resistance from longer wires o.w.t.t.e.   B1

[10]

9 (a) (i) L1 and L2   B1

  (ii) L2 and L3   B1

  (b)   L1 off
           L2 full   – 1 e.e.o.o.   B2
           L3 off
           L1 partial
           L2 partial   – 1 e.e.o.o.   B2
           L3 partial

[6]

10 (a) arrow down, close to or joined to wire   B1

  (b) arrow up, close to or joined to wire   B1

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   (c) (i) moves/bends up   **B1**

      (ii) motor/ammeter/voltmeter/galvanometer/multimeter   **B1**

                                                                            [4]

11 (a) spontaneous/random break up OR unstable atoms   **B1**
        results in new element/particles OR nucleus changes   **B1**
        radioactive particles/α/β/γ emitted   **B1**

    (b) (i) clear statement of start point   **B1**
            clear halving   **B1**
            time to halve is 2 minutes   **B1**

      (ii) 550/2 OR 1100/4 OR 2200/8   **C1**
            275 (counts/min)   c.a.o.   **A1**

                                                                            [8]

12 (a) vacuum   **B1**

  (b) glows or equivalent OR spot OR dot of light on screen   **B1**
       when electrons hit it   **B1**

  (c) heated   **B1**

  (d) cathode   **B1**
       anode   **B1**

  (e) P_1 and P_2 OR y-plates   **B1**

                                                                           [7]